DOES NOT CIRCULATE

VOLUME III December 1955 NUMBER 12

Journal of The

AMERICAN GERIATRICS SOCIETY

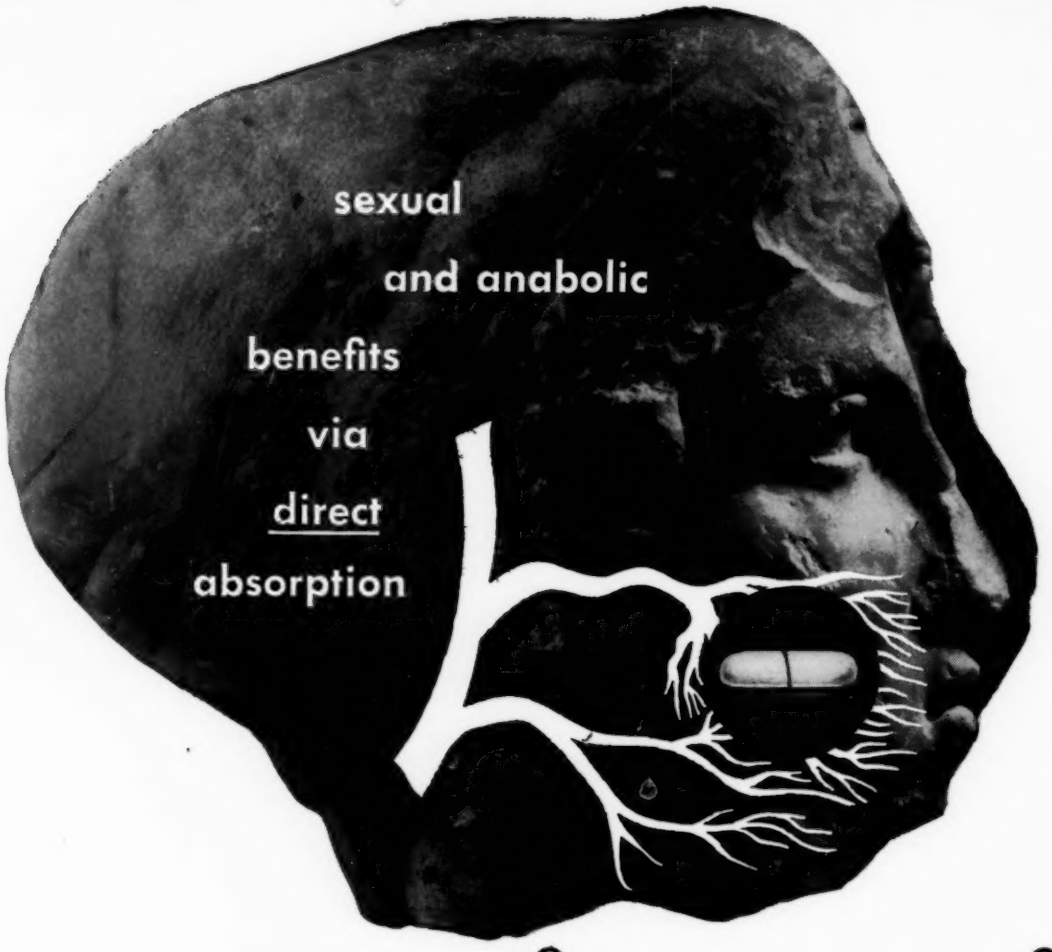
Official Journal

OF THE

AMERICAN GERIATRICS SOCIETY
AMERICAN THERAPEUTIC SOCIETY
TEXAS GERIATRICS SOCIETY

PUBLISHED BY
THE WILLIAMS & WILKINS CO.
BALTIMORE 2, MARYLAND

ANNUAL MEETING—Chicago, Illinois—MAY 3 and 4, 1956



METANDREN® LINGUETS®

the most potent oral androgen

FEMANDREN® LINGUETS®

the most potent oral estrogen with the most potent oral androgen

Buccally or sublingually absorbed LINGUETS by-pass liver inactivation or gastric destruction—are virtually as potent as parenteral steroids—provide effective, convenient, low-cost hormone therapy.

Supply: Metandren Linguets, 5 mg. (white, scored) and 10 mg. (yellow, scored). Femandren Linguets (green, scored), each containing 0.02 mg. ethinyl estradiol and 5 mg. methyltestosterone.

Metandren® (methyltestosterone U.S.P. CIBA)
Femandren® (methyltestosterone with ethinyl estradiol CIBA)
Linguets® (tablets for mucosal absorption CIBA)

C I B A Summit, N.J.

2/ 2079M

MEDICAL HORIZONS TV Monday P.M. *Sponsored by* CIBA ABC-TV

THE JOURNAL OF
The American Geriatrics Society
Official Journal of the American Geriatrics Society

VOLUME III *December, 1955* NUMBER 12

SHOULD THE PATIENT WITH A HEALED MYOCARDIAL INFARCTION AVOID PHYSICAL EXERTION?

LIEUTENANT COLONEL WELDON J. WALKER, MC*

Baylor University College of Medicine, Houston, and Brooke Army Hospital, San Antonio, Texas

Does physical activity cause coronary atherosclerosis or is it likely to precipitate myocardial infarction in a person with pre-existing coronary atherosclerosis? These are most pertinent questions, since it is increasingly evident that coronary atherosclerosis is practically a universal condition among adult American males. Coronary atherosclerosis was demonstrated in 77 per cent of United States soldiers killed in Korea at an average age of 22.1 years (1), and presumably has even a higher incidence in older age groups. There is increasing evidence that the life expectancy of patients surviving myocardial infarction is much better than was formerly believed. A recent insurance study indicated that in the 40–60 age group, half lived more than ten years following their coronary occlusion (2). If physical exertion is dangerous for patients with coronary atherosclerosis then all adult American males should retire today, since most have this disease! Fortunately most evidence indicates that physical activity protects against, rather than promotes atherosclerosis. If such is true, it is imperative that patients with this disease not be relegated to lives of needless invalidism.

British workers have recently made a most extensive study of the incidence and mortality of coronary heart disease in various occupational groups arranged on the basis of their physical activity (3). They found that the early mortality rates of the physically more active workers were lower than those of physically less active workers, and that groups engaged in heavy work had an over-all mortality rate from coronary heart disease less than half that of the groups doing light work. Furthermore, the heavy laborers had a longer survival time from the onset of the disease to death. The study of Glendy and others in 1937 also reported that Americans who had myocardial infarctions early in life came largely from sedentary groups, whereas those who maintained good health

* Chief, Cardiovascular Service, Brooke Army Hospital, San Antonio, and Assistant Professor of Clinical Medicine (Cardiology) Baylor University College of Medicine, Houston, Texas.

beyond 80 years of age had engaged in more than average amounts of exercise (4). A more recent study in the United States reported no correlation between coronary artery disease and occupation or social status (5). This raises the question whether the decreasing physical activity of American males incident to mechanization of industry may not be a factor in the alarming increase in deaths from coronary heart disease in American males, which now exceeds the rate of any other group in the world.

The relationship between activity and the onset of acute coronary occlusions was studied by Master and Jaffe (5). These authors determined the degree of activity before and at the onset of 1,347 attacks of coronary occlusion. They reported that the attacks were equally distributed through all hours of the day and night and in less than 2 per cent was the onset associated with unusual exertion. They concluded that this association was coincidental and that coronary occlusion is a spontaneous event in the course of atherosclerosis. Richardson reported similar findings (6) and concluded, "Attacks of coronary thrombosis will occur at any time, day or night, and are in no way related to the person's activity or emotional state." A discordant note was sounded by Yater and associates (7), who analyzed 689 attacks of coronary thrombosis in American soldiers below the age of 39, and reported a greater number of attacks in association with strenuous activity than one would expect from the time spent in such activity. They concluded, therefore, that physical activity seemed to be a factor in precipitating some myocardial infarctions. If this were true one would have expected a greater incidence in the more strenuous branches of service such as the infantry and paratroopers. However, the reverse was observed and the highest incidence occurred in the more sedentary branches such as the Medical Corps, Finance Department, and Adjutant General's Office (7). Furthermore, autopsy studies showed a higher incidence of old or organizing thrombi in the coronary arteries of those with the onset during exertion than of those with the onset during sleep. This suggests that some of the former actually had sustained a coronary thrombosis earlier, and were erronously reported to have had the onset of their attacks during strenuous activity. If physical exertion were an important factor in precipitating coronary occlusion, one would expect the highest incidence among laborers. In no published study has this been found.

Since an occasional coronary occlusion appears to have arisen at the site of ruptured capillaries growing in atheromatous plaques, some authors have postulated that these vessels may have ruptured from the increased blood pressure incident to exertion. Available evidence fails to support this belief, since at necropsy such capillary hemorrhage is no more frequent in hypertensive than in normotensive patients (5). Winternitz and associates (8) injected fluid into the coronary arteries after death, at a pulsatile pressure exceeding 500 mm. Hg, without rupturing such capillaries. On theoretical grounds one would not expect an increase in intra-arterial pressure to rupture these capillaries, since they lie within the lumen of the blood vessel and are actually supported by such pressure (Fig. 1). Furthermore, subintimal hemorrhage is an infrequent cause of myocardial infarction, accounting for only 3 per cent of the cases in the large

co-operative study by The Committee on Anticoagulants of the American Heart Association (9). It appears that growth of capillaries into atheromatous plaques is a part of the athermatous process and that rupture of these capillaries is sometimes a part of that degenerative process. Exertion, however, has not been incriminated as a contributing cause.

In view of the foregoing considerations, why is the idea so prevalent among patients and physicians alike that once a patient has had a "coronary" he should avoid excitement, physical exertion and even refrain from sexual activity? Probably the greatest factor contributing to this concept has been the failure of the physician to think clearly in terms of the pathologic physiology of the heart. Too often he fails to differentiate in his thinking between angina pectoris and myocardial infarction and between acute myocardial infarction and healed myocardial infarction. If the physician fails to orient his thinking to the specific process, and the stage of that process, he cannot treat the patient properly. Both angina pectoris and coronary artery thrombosis have the same underlying pathologic process, namely, coronary atherosclerosis; yet they differ in respect to the exciting cause of the attack. The importance of exertion and emotions in precipitating an attack of angina is well known. Such patients are advised to avoid activity that will cause pain, because the associated myocardial ischemia may increase cardiac irritability and induce such dangerous arrhythmias as ventricular tachycardia and fibrillation. The vasodilator action of local metabolites, combined with the increased rate of blood flow associated with exercise,

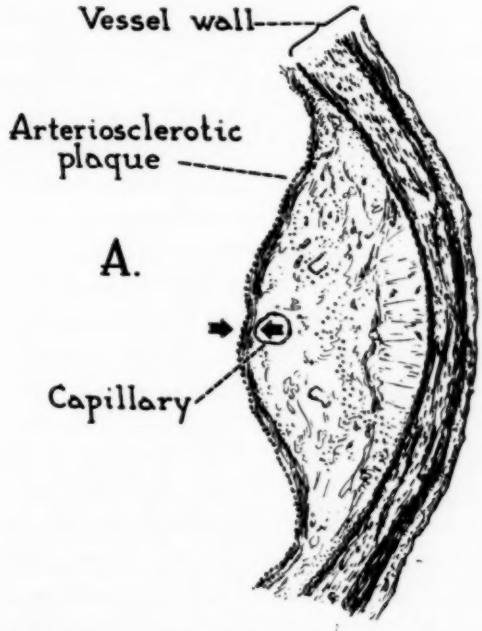


FIG. 1. The intra-capillary pressure will not exceed that of its source, *i.e.*, the pressure within the arterial lumen. The capillary wall is constantly supported by this same pressure, so elevation of arterial pressure will not distend the capillary wall. (Drawing by Mr. George J. Thomas.)

provide the factors that are recognized as desirable to prevent intravascular thrombus formation in other parts of the body, and would not be expected to cause coronary artery thrombosis. The fact that many patients suffer thousands of attacks of angina during their life would argue against the idea that there is danger in activity below the level which causes pain. It is possible that such activity may prolong the lives of these patients by stimulating the development of needed collateral circulation.

In the treatment of patients with myocardial infarction it is important that the therapy be geared to the evolving changes in the myocardium. During the acute stage the patient is put at strict rest because of the ever-present risk of rupture through a softened myocardium. Such accidents usually occur between the fourth and eleventh days (10) and the incidence of cardiac rupture is higher in patients who maintain hypertension or fail to restrict their activity at this time (11). Exertion during the period of acute infarction also predisposes to the development of ventricular aneurysm and congestive failure (12). However, more than one month after an infarction, the danger of cardiac rupture is no longer present and the area of a healed myocardial infarction is the portion of the heart least likely to rupture (13). Following the formation of a firm scar there are, in my opinion, but two reasons to continue restricting the patient's activity: 1) cardiac insufficiency, in which so much of the myocardium has been damaged or destroyed that the heart no longer functions effectively as a pump, and there is dyspnea on exertion, or 2) coronary insufficiency, with angina or cardiac arrhythmia induced by effort. It is extremely important to explain carefully to each patient with a myocardial infarction that, following recovery from the acute episode, the condition for which strict restriction was ordered no longer exists; otherwise he will believe that to prevent further attacks his future activity should approximate that which was allowed during the period of treatment. Such restriction deprives him of the ability to discharge emotional tension through accustomed physical activity; anxiety is increased, he consoles himself by eating, a gain in weight results, and the stage is set for progression of the atheromatous process and for his early demise. The increased death rate from atherosclerosis in sedentary persons may be related to over-nutrition rather than to decreased physical activity per se (14). If the patient is advised to resume normal activity, (in the absence of myocardial or coronary insufficiency) and it is not made clear to him and to his relatives that death is no more likely to strike him on the job than at rest, the relatives may blame the physician for not restricting the patient's activity should he die from a later attack. If on the other hand, the timid physician plays it safe and routinely makes invalids of all such patients, he can't lose. If they subsequently die, he was very astute to have recognized how sick they were; if not, he can claim credit for their survival. The physician's fear to "stick his neck out" and risk possible criticism seems to be one of the principal causes for many restrictions placed on such patients. This may result in the loss of many years of useful living, since as many as 75 per cent of these patients can be returned to productive employment (15). It is important that those who are otherwise without residual disability shall not suffer needless invalidism through an unfounded fear of death from work.

SUMMARY

The belief that strenuous physical exertion may precipitate myocardial infarction in a person with pre-existing coronary atherosclerosis needs critical reevaluation, since numerous studies have shown an increased incidence of myocardial infarction in sedentary workers as compared with those engaged in vigorous physical labor. Furthermore, physically active workers with coronary artery disease have a lower early mortality and a longer survival from the onset of their disease than sedentary workers. To restrict the activity of a patient who has survived a myocardial infarction without residual cardiac or coronary insufficiency probably shortens his actual survival and surely shortens his useful life.

REFERENCES

1. Enos, W. F.; Holmes, R. H., and Beyer, J.: Coronary disease among United States soldiers killed in action in Korea; preliminary report, *J. A. M. A.* **152:** 1090–1093 (July 18) 1953.
2. Robb, G. P., and Marks, H. H.: Report made at annual meeting of the Association of Life Insurance Medical Directors of America, New York, N. Y., Oct. 14–16, 1953.
3. Morris, J. N.; Heady, J. A.; Raffle, P. A.; Roberts, C. G., and Parks, J. W.: Coronary heart disease and physical activity of work, *Lancet* **2:** 1053–1057 (Nov. 21) 1953.
4. Glendy, R. E.; Levine, S. A., and White, P. D.: Coronary disease in youth; comparison of 100 patients under 40 with 300 persons past 80, *J. A. M. A.* **109:** 1775–1781 (Nov. 27) 1937.
5. Master, A. M., and Jaffe, H. L.: Factors in onset of coronary occlusion and coronary insufficiency; effort, occupation, trauma, and emotion, *J. A. M. A.* **148:** 794–798 (Mar. 8) 1952.
6. Richardson, J. L.: Does exertion precipitate coronary thrombosis? *J. Med. A. Georgia* **42:** 89–91 (Feb.) 1953.
7. Yater, W. M.; Traum, A. H.; Brown, W. C.; Fitzgerald, R. P.; Geisler, M. A., and Wilcox, B. B.: Coronary artery disease in men 18 to 39 years of age; report of 866 cases; 450 with necropsy examinations, *Am. Heart J.* **36:** 334–372 (Sept.); 481–526 (Oct.); 683–722 (Nov.) 1948.
8. Winternitz, M. C., Thomas, R. M., and LeCompte, P. M.: The Biology of Atherosclerosis. Springfield, Illinois, Charles C Thomas, Publisher, 1938, p. 6.
9. Wright, I. S.; Beck, D. F., and Marple, C. D.: Myocardial infarction and its treatment with anticoagulants, *Modern Concepts Cardiovasc. Dis.* **23:** 208–212 (Jan.) 1954.
10. Massey, F. C., and Mason, D.: From: Massey, F. C.: Clinical Cardiology. Baltimore, Md., The Williams and Wilkins Co., 1953, p. 657.
11. Jetter, W. W., and White, P. D.: Rupture of the heart in patients in mental institutions, *Ann. Int. Med.* **21:** 783: 802 (Nov.) 1944.
12. Moyer, J. B., and Hiller, G. I.: Cardiac aneurysm; clinical and electrocardiographic analysis, *Am. Heart J.* **41:** 340–358 (Mar.) 1951.
13. Wessler, S.; Zoll, P. M., and Schlesinger, M. J.: Pathogenesis of spontaneous cardiac rupture, *Circulation* **6:** 334–351 (Sept.) 1952.
14. Walker, W. J.: Relationship of adiposity to serum cholesterol and lipoprotein levels and their modification by dietary means, *Ann. Int. Med.* **39:** 705–716 (Oct.) 1953.
15. Kaufman, J. G., and Becker, M. C.: Rehabilitation of the patient with coronary artery disease. Presented at the Annual Meeting of the American College of Physicians, Chicago, Ill., Apr. 7, 1954.

CHANGES IN THE HUMAN INTERVERTEBRAL DISC WITH AGE: A BIOPHYSICAL STUDY

A. NAYLOR, CH.M., M.SC., F.R.C.S.*, F. HAPPEY, PH.D., F.INST.P.† AND T. MACRAE, M.SC.‡

Bradford and Keighley Hospital Groups and Bradford Technical College, Bradford, England

Investigations of the structure of the intervertebral disc have been confined chiefly to studies of the histologic changes. These have been well described by Coventry, Ghormley and Kernohan (1), Smith (2) and Beadle (3). We feel that a more fundamental investigation of the biophysical and biochemical structure is required to explain many of the pathologic states found in association with the age-degeneration of the tissues in the intervertebral disc, and also the processes involved.

The intervertebral disc consists of two parts—the firm, outer annulus fibrosus and the softer, gelatinous nucleus pulposus, one merging into the other so that there is no distinct line of demarcation. Demarcation is more obvious in the young subject and the differentiation of wall and nucleus becomes less clear with age. The cartilaginous end-plates separate the nucleus from the adjacent vertebrae and allow diffusion of fluid from the bone capillaries to the nucleus.

The annulus fibrosus appears to be composed of regularly arranged layers of collagen fibrils, with a ground substance connecting the layers. The nucleus pulposus is of semi-gelatinous consistency and is made up of a network of swollen collagen fibrils embedded in an amorphous matrix. Such a gelatinous structure confers upon the nucleus certain properties of fluids, *i.e.*, incompressibility and ability to transmit thrust. A further property of the nuclear matrix is its ability to absorb the water or saline in which it is immersed. This is in general contradistinction to other collagenous material, such as tendon or cartilage, which seems to maintain equilibrium with the fluid in which it is immersed.

HYDROPHILIC PROPERTIES OF THE DISC

Our experimental work has shown that the properties of the collagen and the power of water absorption alter considerably with age and may account for the known pathologic changes and disturbances of function of the intervertebral disc which occur in elderly persons. Two projects have been undertaken: 1) an investigation of the collagenous changes in the annulus and nucleus with age, using x-ray crystallographic methods, and 2) an enquiry into their capacities for absorption of fluid.

Püschel (4) demonstrated that the water content of the nucleus pulposus was approximately the same for every disc of any given subject, provided that there

* Consultant in Orthopaedic Surgery.
† Head, Textile Department.
‡ Wool Textile Research Council Fellow.

were no evidences of degeneration. Pathologic changes in the water balance of the body, *e.g.*, in renal edema, were shown to have no effect on the water content of the disc nuclei. The nuclear water content was demonstrated to be highest at birth, being 88 per cent by weight of the nuclear tissue, but decreasing with age to 80 per cent at 18 years and 69 per cent at 77 years. By comparison, the annulus fibrosus has a water content of 78 per cent at birth, decreasing to 70 per cent at 30 years. Thereafter the content is static until extreme old age, when a slight fall occurs.

Göcke (5) also studied the hydrophilic properties of the nucleus. He observed the effects of soaking fragments of nucleus pulposus in saline, acid and alkaline solutions. Discs from young subjects took up 95 per cent of their weight of water, whereas those from adults absorbed 50–60 per cent of their weight of water. The power of absorption was further reduced in discs from aged subjects.

We (Naylor and Smare (6)) have repeated Göcke's work and noted that the addition of hyaluronidase to the immersion fluid increased the weight of fluid absorbed by 20 per cent. No clear, linear relationship between the degree of fluid absorption and age could be found, but varying degrees of absorption in discs of subjects of the same age were observed.

A further preliminary series of experiments was undertaken, to study the possibility of the development of an internal pressure within an intact disc on immersion in fluid (6). These studies demonstrated that a high pressure could develop within a disc by fluid absorption. An actual nuclear herniation was produced in one specimen, and a fracture of the end-plate and reproduction of a Schmorl's node occurred in another, the end-plate of which had been cut very thinly. No pressure developed in specimens with advanced disc degeneration.

Meanwhile, Charnley (7) showed that isolated nuclear tissue could absorb fluid and develop a considerable pressure when kept in a rigid container. Further, this fluid absorption occurred when the nuclear tissue was placed in either isotonic or hypertonic solution.

RELATION TO DISC PROLAPSE AND DEGENERATION

The possibility that this hydrophilic property of the nucleus has a bearing upon the development and symptomatology of low back pain, brachial neuritis and disc prolapse, was then suggested (Naylor (8), Charnley (7), Naylor and Smare (6)). The question arises as to the nature of the agent which determines this hydrophilic property of the nucleus pulposus. It is probable that one of these agents is the muco-polysaccharide which is present in high concentration and has a high water-binding capacity. Significantly, the polysaccharide content of the disc falls with advancing age (9), as does the power of fluid absorption. Confirmatory evidence has been obtained by our studies of the age changes in the disc, using x-ray crystallographic methods.

Our investigations have led us to postulate the following hypothesis to explain the sequence of events associated with disc prolapse and disc degeneration:

1. The depolymerization of the polysaccharides of the polysaccharide/colla-

gen complex in the nucleus, possibly initiated by some metabolic or endocrine factor. This would lead to:

2. Increased power of fluid absorption, leading to
3. Increased pressure within the disc.

The latter could be increased considerably by the forces of leverage and muscular action at the level of the affected disc.

The increased pressure would stretch the annulus fibrosus and stimulate the nerve endings combined within it and its related ligamentous structures, and so produce localized backache, and possibly root radiation. If many discs were affected, then the generalized pain associated with "fibrositis" might develop.

As the residues of depolymerization are removed from the nucleus by diffusion into the circulation via the bony end-plate of the disc, the internal pressure would return to normal. This could account for the spontaneous resolution of the symptoms in many cases of disc derangement. If the annulus were weakened, then the pressure developed within the disc might produce a herniation and not compression. Mechanical factors may tend to maintain the prolapse, although the natural tendency to resolution may have caused shrinkage of the herniation.

The foregoing sequence of events could be repeated after an interval, and would explain the periodicity and remissions of symptoms characteristic of the syndrome. Each attack would remove some polysaccharide from the nucleus, thus increasing the degenerative change in the disc. Ultimately a stage would be reached at which the polysaccharide content and the associated power of fluid absorption would be so reduced that the pressure developed would be insufficient to cause tension or herniation. Such an hypothesis would explain the known fact that disc prolapse is rare after the age of 60, and that recurrent symptoms in a patient become less frequent with advancing age.

Our x-ray crystallographic studies were made on fresh cadaveric discs or operation specimens, using a comparatively high intensity beam so as to allow x-ray diffraction photographs to be obtained rapidly before appreciable structural changes could occur. Specimens of nucleus and annulus were air-dried by exposure for ten hours in order to eliminate most of the unbound water which, if present, produces an intense diffuse ring in the x-ray diffraction diagrams and thus masks the x-ray diagram of the collagen/polysaccharide complex. If dried too long, irreversible changes occur. We think that during the time of the x-ray exposure of approximately half-an-hour, the moisture content remained unchanged. Later experiments were made using freeze-dried specimens. By this means, the samples retained their swollen condition, as little water was dried out during the examination.

The collagen of the rat-tail tendon was used as a standard for comparison. Stretching was found to affect its x-ray diagrams as follows:

1. Increase in orientation of the fibrils.

2. A reversible increase in the spacings associated with distance along the fiber axis, comparable to the lattice extension of the α-keratin before the $\alpha \rightarrow \beta$ transformation occurs (Table 1).

TABLE 1*

Reflections in X-ray Diagram of Rat-tail Tendon

Equatorial Reflections		Meridional Reflections		Other Reflections	
Unstretched	Stretched	Unstretched	Stretched	Unstretched	Stretched
11.8 Å 5.7 Å 4.6 Å	11.8 Å 5.7 Å 4.6 Å	2.86 Å 3.95 Å	2.95 Å 4.04 Å	7.2 Å	7.4 Å

* Tables 1–4 are reproduced by courtesy of the British Medical Journal from Naylor, Happey and MacRae (12).

TABLE 2

Nucleus Pulposus. Air-dried Specimens

Age	Spacings of Reflections			Remarks
	Equatorial	Meridional	Other Reflections	
3 weeks		2.85 Å	2.0 Å	Completely disorientated structure. Side-chain spacing absent
			2.0 Å	Still disorientated. 3.2 Å and 4.3 are diffuse
1½ years	11.8 Å	2.85 Å	3.2 Å 4.3 Å	
2½ years	11.8 Å 4.6 Å	2.85 Å		2.0 Å ring has disappeared. Side-chain spacing at 11.8 Å now resolved
25 years to 28 years. Diagram still disorientated, but shows increasing definition				
48 years	11.8 Å 4.7 Å	2.85 Å 3.20 Å	4.3 Å	
70 years	11.8 Å 4.7 Å	2.85 Å 3.90 Å		Collagen phase well orientated—*i.e.*, becoming crystalline
78 years	11.8 Å 4.7 Å	2.85 Å 3.90 Å		
Newly Excised Freeze-dried Specimens				
51 years	14.5 Å	2.85 Å 4.00 Å		Disorientated liquid phase

NUCLEAR CHANGES WITH AGE

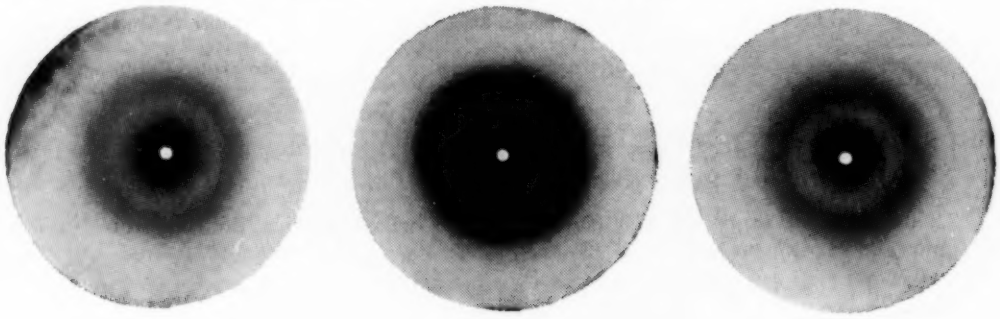
Specimens from subjects aged 3 weeks to 79 years were examined, the results being summarized in Table 2 (*see* Figs. 1–3). The equatorial spacing at 11.8 Å is associated with the side-chain spacing, *i.e.*, the average distance between the chains. In early life this reflection was absent, but was present in the remaining specimens, and the spacing was constant. In the young disc it has been shown

Nucleus Pulposus

FIG. 1. From subject aged 3 weeks

FIG. 2. From subject aged 48 years.

FIG. 3. From subject aged 70 years.



1 2 3

X-ray beam parallel to spinal axis. Photographs taken immediately after excision from the disc, *i.e.*, in a "wet" state).

(Reproduced by courtesy of the British Medical Journal from Naylor, Happey and MacRae (12).)

that in drying the nucleus, the x-ray diagram of the specimen shows reflections which are characteristic of common salt. This saline content appears to decrease with age and is not obvious on the x-ray diagrams of specimens of other years.

The other spacings listed in Table 2 appear to agree with those found in the rat-tail tendon. It is difficult, however, to identify them with any specific measurement in the same manner as those of the 11.8 Å and 2.85 Å spacings, except for the 4.7 A reflection which appears to be due to a disorientated β-structure superimposed on that of the orientated collagen. An increase from 11.8 Å to a minimum of 14.5 Å in the side-chain spacing is seen in the freeze-dried specimens, and spreading of these arcs in the x-ray diagram suggests a mean separation of about 20–30 Å.

Our results suggest that with advancing age the collagen of the nucleus pulposus becomes more orientated and a degenerative process is proceeding until, in very advanced age, a stage of crystallization and fibrillation of the collagen is reached. This process is most probably associated with reduction in the mucopolysaccharide content of the nucleus, the nucleus then losing its gel structure. The presence of the disorientated pattern typical of a β-protein, shown by the strong ring at 4.7 Å and a more diffuse reflection at approximately 3.9 Å in the specimens from subjects aged 70 and 78 years, is significant. It is possibly due to the denaturation of the folded and soluble proteins into a fully extended form to give a disorientated and tightly hydrogen-bonded β-crystalline lattice which would inhibit any elasticity in the nucleus. These latter patterns suggest that the nucleus pulposus is no longer an isotropic medium and is, therefore, incapable of distributing stresses uniformly throughout the disc structure.

ANNULAR CHANGES WITH AGE

The crystallites of the collagen system are, in general, not parallel. Thus the diffraction picture will not consist of separate spots but of arcs, due to the dis-

TABLE 3

Annulus Fibrosus—Air-dried Specimens

Age	Spacings of Annulus Fibrosus			Remarks
	Equatorial	Meridional	Other Reflections	
3 weeks	11.8 Å	2.85 Å		Disorientated structure with other very diffuse reflections
1½ years	11.8 Å	2.85 Å		Still almost completely disorientated
2½ years	11.8 Å	2.85 Å 3.92 Å	4.7 Å	Slight orientation; uniaxial dispersion
From 2½ to 36 years the orientation increases, with the reflections becoming sharper				
44 years	11.8 Å	2.85 Å 3.94 Å	4.7 Å 5.8 Å 7.3 Å	Orientated biaxial structure
48 years to 70 years, the spacings vary only slightly about values given for age 44. The main differences are in the increasing orientation with increase in age. Biaxial dispersed system becoming uniaxial				
78 years				
Freeze-dried Specimens				
45 years	14.5 Å	2.85 Å 4.00 Å	7.0 Å 3.3 Å	Disorientated liquid phase

persed orientation of the crystallites about an axis. This distortion of internal structures causes the angular spread of the spots, and from the geometry of the diffraction diagram and measurements of this angular spread of the arcs on the x-ray diagram, the dispersion of the crystallites around the fiber axis can be calculated (10).

The results of examination of the annular specimens are tabulated in Table 3 (*see* Figs. 4–7). A uniaxial dispersion of the crystallites of the collagen of the annulus fibrosus is seen before the age of 35 years, but specimens from older subjects show an increasing biaxial character (dispersions shown diagrammatically in Figs. 8 and 9). Beyond 48 years, a preferred orientation appears to develop in the biaxial system, so that there is a tendency to revert to the uni-axial fibrillar orientation. X-ray photographs of specimens from subjects aged 35 years were taken with the x-ray beam parallel to the spinal axis (Fig. 8b) and perpendicular to the radial direction of the disc. These show less dispersion than with the beam in a radial direction. From this we would suggest that the fibrils are laid down in concentric cylinders around the radius in the plane of a cylinder, but with the same variation of orientation in the cylinder wall.

The dispersions of the fibers at varying ages are shown in Table 4.

TABLE 4

Annulus Fibrosus. Air-dried Specimens

Age (years)	Uniaxial Semiangle ϕ	Biaxial		Ω	Remarks
		$2\phi_1$	$2\phi_2$		
2½	60°				
35	56°				
35	28°				Beam parallel to spinal axis
44		50°	40°	45°	Approximately equal intensity of arcs
48		60°*	70°	65°	Unstretched (see Fig. 8,c)
48		40°	40°	40°	Stretched approximately 15% (see Fig. 8,a)
53		50°	60°	55°	See Fig. 8,c
67	42°				
70		50°*	60°	55°	See Fig. 8,f
78	45°				
		Freeze-dried Specimen			
45		25°	25°	70°	See Fig. 9
51		30°	25°	65°	See Fig. 9

ϕ = Semi-angle of dispersion in uniaxial system. ϕ_1 and ϕ_2 = Semi-angles of dispersion about the two axes of the biaxially dispersed system. Ω = Angle between the two axes.

* Arcs of increasing higher intensity with age, showing the development of a preferred orientation and the eventual reversion from the biaxial to a uniaxial system. This change, however, occurs at ages varying between 65 and 75 years.

DISCUSSION

The collagen molecule is known to be a stable form of a particular configuration of the amino-acid residue in the polypeptide chain. The reversible elasticity of the keratin-epidermin-fibrinogen group of proteins has been shown to be associated with a molecular transformation of the type, whereas the fibrils of collagen appear to be inextensible except for a small lattice stretch of about 2.5 per cent. Any elongation is, therefore, likely to be concerned with the orientation of the fibrils in the annular walls as shown by our x-ray diffraction diagrams.

The angles of dispersion of the reflections produced before and after stretching of the specimens of annulus fibrosus show that the elongation is probably connected with changes in orientation of the fibrils in the wall (Fig. 8, c and d).

Calculations (11) for a specimen from a subject aged 40, show an elongation of approximately 13 per cent, which agrees with the measured stretching of the actual specimen of approximately 15 per cent. This gives some indication of the degree of stretching which can be obtained by change of orientation. As the extension appears to be readily reversible, it is reasonable to assume that the increase in orientation of the collagen fibrils is associated with the elasticity of the annulus.

To recapitulate, the elasticity and efficient function of an intervertebral disc are dependent upon two chief factors:

1. The gel properties of the nucleus. The nucleus should be readily deformable

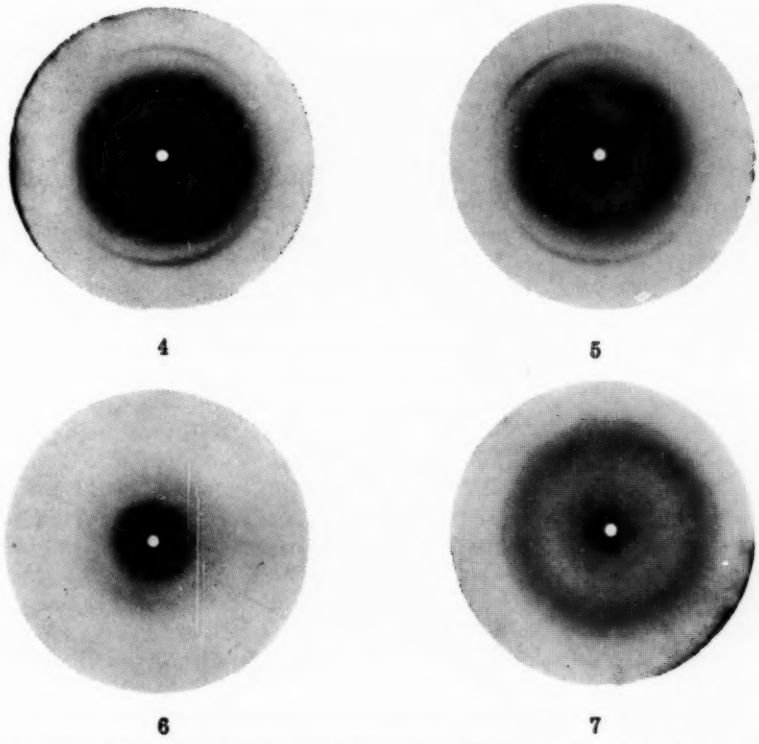
Annulus Fibrosus

FIG. 4. From subject aged 2½ years.

FIG. 5. From subject aged 48 years.

FIG. 6. From subject aged 78 years.

FIG. 7. From subject aged 45 years.



X-ray beam parallel to radial direction of disc. Photograph taken immediately after excision from the disc, *i.e.*, in a "wet" state.

(Reproduced by courtesy of the British Medical Journal from Naylor, Happey and MacRae (12).)

but incompressible, and so convert vertebral force into a radial force of the annulus (Fig. 10).

2. The annulus must act as an elastic ring to dissipate the stresses and strains applied to the vertebral column. This is possible because of the arrangement of the collagen fibrils in their matrix, which is flexible enough to allow the fibrils to show elasticity due to changes in orientation.

Our experiments show that these two factors are affected by changes in the collagen structure of both annulus fibrosus and nucleus pulposus which appear at the end of the third decade and increase with advancing age.[1] That the nucleus loses its gel properties is manifested by increased orientation and crystallization of the collagen with advancing age. The collagen of the annulus fibrosus undergoes similar changes, but the fibrillar orientation appears to alter its biaxial structure and this probably inhibits further the elastic mechanism of the disc. It is, therefore, suggested that these factors may underlie the loss of physiological function of the disc with advancing years, with secondary effects upon the

[1] Further experiments now being undertaken appear to show that these changes may be present to a small extent in specimens of much earlier origin.

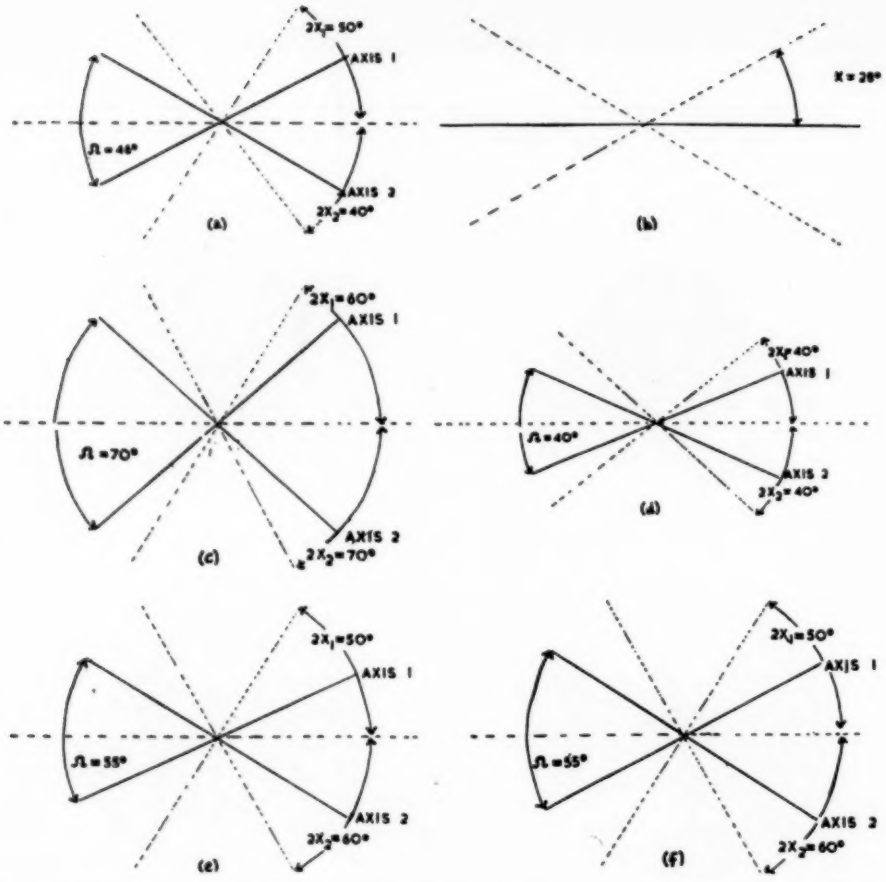


FIG. 8. Biaxial orientation of annulus fibrosus—dry specimens. (a) Age 44. Beam perpendicular to spinal axis. (b) Age 35. Beam parallel to spinal axis. (c) Age 48. Unstretched. (d) Age 48. Stretched. (e) Age 53. (f) Age 70. (Reproduced by courtesy of British Medical Journal from Naylor, Happey and MacRae (12).)

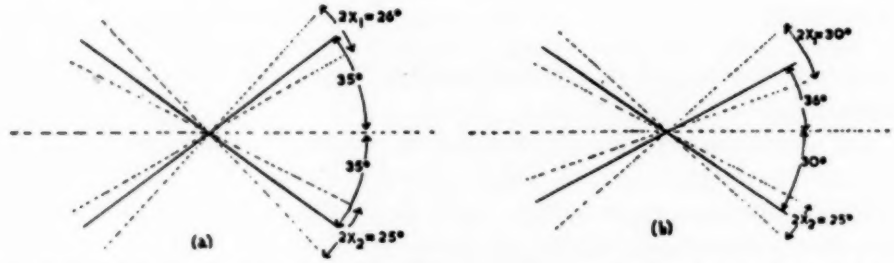


FIG. 9. Biaxial orientation of annulus fibrosus—wet specimens. (a) Age 45. (b) Age 51. (Reproduced by courtesy of the British Medical Journal from Naylor, Happey and MacRae (12).)

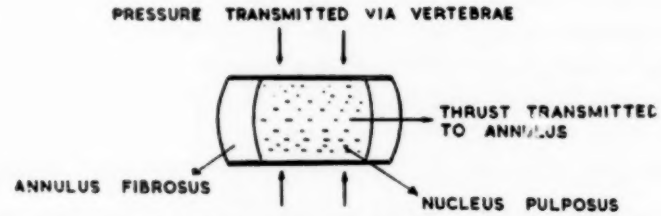


FIG. 10. Elastic mechanism of the intervertebral disc. (Reproduced by courtesy of the British Medical Journal from Naylor, Happey and MacRae (12).)

associated spinal joints. In particular, the mobility of the joints may be restricted.

Acknowledgment

The Editors of the Journal of the American Geriatrics Society wish to express their thanks to the Editor of the British Medical Journal for his kind permission to reproduce the tables and figures appearing in this article.

REFERENCES

1. Coventry, M. B.; Ghormley, R. K., and Kernohan, J. W.: Intervertebral disc; its microscopic anatomy and pathology; anatomy, development, and physiology, *J. Bone & Joint Surg.* **27:** 233–247 (Apr.) 1945.
2. Smith, N. R.: Intervertebral discs, *Brit. J. Surg.* **18:** 358–375 (Jan.) 1931.
3. Beadle, O. A.: The Intervertebral Discs: Observations on Their Normal and Morbid Anatomy in Relation to Certain Spinal Deformities. London, H. M. Stationery Office, Medical Research Council, Special Report Series, No. 161, 1931.
4. Püschel, J.: Der Wassergehalt normaler und degenerierter Zwischenwirbelscheiben, *Beitr. path. Anat.* **84:** 123–130 (Feb. 14) 1930.
5. Göcke, C.: Das Verhalten der Bandscheiben bei Wirbelverletzungen, *Arch. f. orthop. u. Unfall-Chir.* **31:** 42–80 (Feb. 10) 1932.
6. Naylor, A., and Smare, D. L.: Fluid content of the nucleus pulposus as a factor in the disk syndrome; preliminary report, *Brit. M. J.* **2:** 975–976 (Oct. 31) 1953.
7. Charnley, John: The imbibition of fluid as a cause of herniation of the nucleus pulposus, *Lancet* **1:** 124–127 (Jan. 19) 1952.
8. Naylor, A.: Brachial neuritis, with particular reference to lesions of cervical intervertebral discs; Hunterian Lecture, *Ann. Roy. Coll. Surgeons England* **9:** 158–188 (Sept.) 1951.
9. Sylven, B.; Paulson, S.; Hirsch, C., and Snellman, O.: Biophysical and physiological investigations on cartilage and other mesenchymal tissues. II. The ultrastructure of bovine and human nuclei pulposi, *J. Bone & Joint Surg.* **33-A:** 333–340 (Apr.) 1951.
10. Astbury, W. T.: Croonian Lecture; on structure of biological fibres and problem of muscle, *Proc. Roy. Soc., London* s. B. **134:** 303–328 (July 2) 1947.
11. Happey, F.; MacRae, T. P., and Naylor, A.: X-ray crystallographic investigation of the changes with age in the structure of the human intervertebral disk, *in*: Nature and Structure of Collagen, Faraday Soc., New York, Academic Press Inc., 1953, pp. 65–85.
12. Naylor, A.; Happey, F., and MacRae, T.: The collagenous changes in the intervertebral disk with age, and their effect on its elasticity, *Brit. M. J.* **2:** 570–573 (Sept. 4) 1954.

THE TREATMENT OF INTESTINAL OBSTRUCTION IN THE AGED*

GEORGE WANTZ, M.D. AND FRANK GLENN, M.D.

The Department of Surgery, The New York Hospital-Cornell Medical Center, New York, N. Y.

Acute mechanical intestinal obstruction is a serious condition and requires emergency surgical treatment for its relief. In the past twenty-five years great strides have been made in the treatment so that the mortality, once 40–50 per cent, has been reduced to about 10 per cent (1). Yet, when only elderly patients are considered, there has been little change in the mortality. Ferguson, Smith and Houston (2) reported a mortality of 53.8 per cent in 210 patients with intestinal obstruction over the age of 60 years. In a similar group of 123 patients Cutler (3) reported a mortality rate of 57 per cent.

It is natural to assume that the elderly patient with associated chronic diseases and limited physiologic reserves is more likely to succumb to the effects of intestinal obstruction. However, Cutler concluded in his case analysis that no more than 10 per cent of the fatalities were due to associated conditions, and that the remaining 47 per cent were traceable to the effects of the intestinal obstruction or its management. McLaughlin and Brush (4), by applying proven, reliable therapeutic measures, reduced the mortality in patients over 60 years of age with intestinal obstruction from 28 per cent to the astounding figure of 2.8 per cent. It would appear that early employment of sound treatment is the most important factor in preventing the lethal effects of acute mechanical intestinal obstruction in the aged.

With this in mind, it is appropriate to consider the treatment of intestinal obstruction in the aged, though it is fallacious to assume that it differs from that in any age in essentials.

The present study is an analysis of the cases of acute mechanical intestinal obstruction in aged patients seen on the pavilion services of The New York Hospital during the period 1944–1954. The purpose was to determine the merit of the treatment and the causes of death.

CLINIC MATERIAL AND MORTALITY RATES

There were 120 patients over the age of 65 years with acute mechanical intestinal obstruction. The average age was 71.8 years. There were 19 deaths—an over-all mortality of 15.08 per cent. The average age in these 19 patients was 74.8 years.

The etiologies of the intestinal obstruction fell into a natural classification and are listed in Table 1. External herniae, adhesions and neoplasm were the chief causes, in a proportion similar to that found in cases of intestinal obstruction in younger individuals. The 39 cases of external herniae were subdivided as follows: 17 femoral, 14 inguinal, 5 ventral and 3 umbilical. Of the 21 cases of neoplasm, 16 were in the left colon, 3 in the right colon and 2 in the small intestine.

* Presented at the Annual Meeting of the American Geriatrics Society, New York, N. Y., April 21–22, 1955.

The results of operative and non-operative treatment with respect to the etiologies are shown in Table 2. An emergency operation was performed as the definitive form of treatment in 110 cases. There were 14 deaths—an operative mortality of 12.73 per cent. Of the 10 remaining patients, 5 survived as a result of successful non-operative treatment and 5 succumbed—a non-operative mortality of 50 per cent. Of the 5 non-operative patients who died, 4 were considered too ill to undergo an operation and in 1 a diagnosis of intestinal obstruction was not made.

Our experience in the treatment of small-bowel obstruction is summarized in Tables 3 and 4. There were 80 cases of small-bowel obstruction with 11 deaths—a mortality of 13.7 per cent. Simple small-bowel obstruction occurred in 45 cases with 4 deaths—a mortality of 11.2 per cent. Seven deaths occurred in the

TABLE 1

Etiologic Incidence of Intestinal Obstruction in 120 Aged Patients
The New York Hospital–Cornell Medical Center
1944–1954

Etiology	No. of cases	Per cent
External hernia (all types)	39	32.51
Adhesions	28	23.30
Neoplasm	21	17.50
Diverticulitis (colon)	9	7.50
Volvulus	7	5.84
Internal hernia	4	3.34
Mesenteric occlusion	4	3.34
Obstruction of anastomosis (colon)	4	3.34
Gallstones	3	2.50
Stricture (ileum)	1	0.83

TABLE 2

Operative and Non-Operative Fatalities
The New York Hospital–Cornell Medical Center
1944–1954

Etiology	*Operative*		*Non-operative*	
	No. of cases	Deaths	No. of cases	Deaths
External hernia	39	1	0	0
Adhesions	25	2	3	1
Neoplasm	21	6	0	0
Diverticulitis	6	1	3	0
Volvulus	6	2	1	1
Internal hernia	4	0	0	0
Mesenteric occlusion	1	1	3	3
Obstruction of anastomosis	4	0	0	0
Gallstones	3	1	0	0
Stricture	1	0	0	0
Total	*110*	*14*	*10*	*5*

TABLE 3

Small-Bowel Obstruction
The New York Hospital–Cornell Medical Center
1944–1954

Etiology	*Single obstruction*		*Strangulated obstruction*	
	No. of cases	Deaths	No. of cases	Deaths
Femoral hernia	6	0	9	0
Inguinal hernia	2	0	11	1
Ventral hernia	2	0	2	0
Umbilical hernia	0	0	3	0
Adhesions	25	3	2	0
Mesenteric occlusion	0	0	4	4
Volvulus	2	0	3	2
Internal hernia	3	0	1	0
Gallstones	2	1	0	0
Neoplasm	2	0	0	0
Stricture	1	0	0	0

TABLE 4

Mortality in Small-Bowel Obstruction
The New York Hospital–Cornell Medical Center
1944–1954

	No. of cases	Deaths	Per cent
Simple small-bowel obstruction	45	4	11.2
Strangulated small-bowel obstruction	35	7	20.0
Total	*80*	*11*	*13.74*

35 cases of strangulated small-bowel obstruction—a mortality of 20 per cent. Of these 7 patients who died, 4 were not operated upon, which accounts for the increased mortality.

Experiences with large-bowel obstruction are summarized in Tables 5 and 6. There were 40 patients with large-bowel obstruction, of whom 8 died—a mortality of 20 per cent. Seven deaths occurred in 35 cases of simple large-bowel obstruction and 1 death occurred in the 5 strangulated large-bowel obstructions. This high mortality rate is not surprising, as almost half of the large-bowel obstructions were due to carcinoma, and 3 of the 8 deaths were the result of terminal carcinomatosis.

Long-tube decompression was chosen as the definitive treatment in 11 cases of small-bowel obstruction. It was successful in only 2 instances. It delayed operation in 9 cases, 1 of which terminated in death from fluid and electrolyte imbalance following operation for the lysis of adhesions. The remaining 8 cases were salvaged, fortunately, without complications.

The causes of death were varied and are summarized in Table 7. Shock and peritonitis were the most common causes, and they occurred in 8 cases directly

due to the effects of the intestinal obstruction. In 2 cases they occurred as complications of the operation. In 1 case the patient died of fluid and electrolyte imbalance. Thus there were 11 deaths resulting from the intestinal obstruction or its management. Of the remaining 8 deaths, 4 were cardiovascular in nature and 4 were due to terminal carcinomatosis. Eliminating the deaths from terminal carcinomatosis, it is apparent that the overwhelming majority of the fatalities might have been prevented had prompt and sound treatment been carried out.

TABLE 5

Large-Bowel Obstruction
The New York Hospital–Cornell Medical Center
1944–1954

Etiology	*Single obstruction*		*Strangulated obstruction*	
	No. of cases	Deaths	No. of cases	Deaths
External hernia	1	0	3	0
Adhesions	1	0	0	0
Volvulus	0	0	2	1
Diverticulitis	9	1	0	0
Gallstones	1	0	0	0
Carcinoma left colon	16	5	0	0
Carcinoma right colon	3	1	0	0
Obstruction of anastomosis	4	0	0	0

TABLE 6

Mortality in Large-Bowel Obstruction
The New York Hospital–Cornell Medical Center
1944–1954

	No. of cases	Deaths	Per cent
Simple large-bowel obstruction	35	7	20
Strangulated large-bowel obstruction	5	1	20
Total	*40*	*8*	*20*

TABLE 7

Causes of Death
The New York Hospital–Cornell Medical Center
1944–1954

Causes	No. of cases	Per cent of total
Shock and peritonitis secondary to obstruction	8	42.2
Cardiovascular	4	21.0
Carcinomatosis	4	21.0
Peritonitis secondary to operation	2	10.5
Fluid and electrolyte imbalance	1	5.3

Our experience indicates that age and concomitant diseases are of secondary importance as causes of death and that the early application of reliable established therapeutic measures will reduce the mortality of intestinal obstruction in the aged patient.

TREATMENT

The final objective in the treatment of mechanical intestinal obstruction is the relief of the obstruction and restoration of the continuity of the intestinal tract. This is best achieved by operation. There are, however, common deleterious effects produced by intestinal obstruction, irrespective of the etiology, which must be relieved or corrected before operation can be safely performed and the final objective realized. These are vomiting, distention, and loss of body water, electrolytes, plasma and red blood cells. In addition there are the jeopardizing conditions attendant upon old age which must be considered in the proper evaluation of these patients.

Naturally, maximum benefits from preoperative preparation are desirable, but unnecessary delay in the hope of better preparation is hazardous. Early treatment is the safer way to avoid the catastrophic effect of late mechanical intestinal obstruction. If success is to be the outcome, all phases of treatment must be accurately and swiftly performed.

Decompression

Decompression of distended small intestines can often be achieved by the passage of a long intestinal tube. A single-lumen tube with a mercury weighted balloon is preferred to the double-lumen tube. However, its passage is often difficult. If the tube is placed in the stomach when the patient is first seen, then the tip can be inserted in the pylorus under fluoroscopy while initial diagnostic x-ray studies are being carried out. Even if the tube does not progress, it will at least decompress the stomach and postoperatively may reach the small intestine and aid in avoiding troublesome adynamic ileus.

The greatest value of tube decompression is to prevent vomiting while preparing the patient for operation and during the postoperative period. It should be remembered that it is not without its disadvantages, and prolonged use, after it has served its function, may be harmful.

Repletion

Patients with acute intestinal obstruction, when seen, are dehydrated. They have lost not only water and salt, but plasma, red cells, vitamins and many other components. No set pattern will exist and the degree of depletion is dependent on the level of the obstruction, duration of the distention, intensity of vomiting and whether or not peritonitis is present. The effects of depletion, if allowed to progress, are lethal. Correction must be rapid to ensure a safe operation, but not too rapid to overburden a weakened renal or cardiovascular system. Complete repletion of the deficits is ideal, though this commonly is impossible to achieve without harmfully delaying operation. If replacement therapy be insti-

tuted promptly, operation can generally be performed safely within a period of hours, and the replacement completed in the postoperative period.

Evaluation of replacement therapy should be based on clinical findings in addition to the routine laboratory studies such as hemoglobin, hematocrit and urinalysis. Blood should be drawn for determination of urea nitrogen, carbon dioxide combining power, and serum sodium, potassium and chloride levels. The values will serve as a baseline for future care. Waiting for the results is unnecessary, as the exact values will in no way alter the initial therapy.

Recently there has been a tendency to estimate the existing total deficit and then to correct it by an infusion containing the lost components in their proper proportions. This is not practical, as it requires a large stock of various solutions on hand and an estimate, often erroneous, of the deficit. Furthermore, the dehydrated cell with altered metabolism may not utilize the provided elements.

We begin repletion with an infusion of isotonic saline. The immediate advantages of increased serum sodium concentration, urinary output and blood pressure seem to offset the disadvantage of increasing intracellular dehydration and dilution of extracellular potassium. The saline is followed by 5 or 10 per cent glucose solution in water, to supply water to the dehydrated cells. The quantity of the fluids can only be estimated from the patient's history and weight change. About two thirds of this quantity should be a saline or electrolyte solution; the other third should be a non-electrolyte solution. In addition to this estimated quantity of fluid, the daily baseline requirement must be included.

Changes in the acid-base balance require correction. In intestinal obstruction acidosis is commonly present and can be combated by 1/6 M sodium lactate. Should there be interference with lactate metabolism (as in shock, hepatic or cardiac disease) 1.3 per cent sodium bicarbonate may be used. If dehydration is moderate to severe, it may be advisable to supply extra sodium, since 0.9 per cent saline, though isotonic, is not physiologic and contains more chloride than exists in the extracellular fluid.

The quantity of lactate to be given varies. In general, it should be administered until the signs of acidosis, such as dyspnea and hyperpnea, have been relieved. A suitable plan for estimating the quantity of lactate has been suggested by Hoffman (5): for alkalosis, saline alone; for normal CO_2 combining power, 3 parts of saline to 1 part of 1/6 M sodium lactate; and for acidosis, 3 parts of saline to 2 parts of 1/6 M sodium lactate.

Potassium is not added to the infusions until there is a good urinary output and the serum level is known. Vitamins should also be included in the fluids.

In all cases of moderate to severe dehydration there is a concomitant loss of plasma proteins. Rapid replacement of water and electrolytes alone in the presence of a lowered serum protein level will result in edema. Protein is best replaced by blood, given after the initial infusion. The proportion of 500 cc. of blood for every 3,000 cc. of replacement solution, as recommended by Coller and Berry (6), is adequate, provided severe anemia does not exist.

The rate of administration is determined by the degree of dehydration and the rate of its development. In general, about half of the replacement fluids may be

given during the hours prior to operation, and the remainder given during and immediately after operation. Lesser degrees of dehydration can often be completely corrected prior to operation.

Antibiotics

Antibiotics should be given to all patients with intestinal obstruction. There is experimental evidence (7, 8) to indicate that antibiotics increase the survival time in closed-loop and strangulated obstructions. They definitely will reduce the incidence of complicating infections. They will not, however, take the place of good postoperative care or meticulous surgery. Penicillin and streptomycin are a useful combination. If peritonitis is present, increased dosage, in combination with a broad-spectrum antibiotic, is necessary.

Surgery in small-bowel obstruction

Simple mechanical small-bowel obstruction can in certain cases be safely and adequately treated by tube decompression alone. Operation is then either avoided or postponed, thus substituting an elective for an emergency procedure. However, tube decompression is followed by a high percentage of recurrences. Furthermore, the cause of the intestinal obstruction often remains unknown. Operation is delayed and replacement therapy may lag during such a period of false reassurance. We, therefore, are opposed to definitive tube decompression in the treatment of mechanical small-bowel obstruction, except in the case of peritonitis or the "chronic repeater." In these instances, extensive broad-base adhesions are usually present and the incidence of strangulation is low.

If tube decompression is the treatment of choice, the tube should be allowed to descend into the small bowel for 4 to 5 feet and suction should be maintained until all signs of intestinal obstruction have disappeared (tested by clamping the tube). There are three indications for immediate operation when using tube decompression: 1) strangulation, 2) failure to relieve the obstruction within thirty-six to forty-eight hours, and 3) recurrence of the obstruction. Procrastination in the presence of these indications leads only to increased morbidity and mortality.

Operation is the procedure of choice for the relief of small-bowel obstruction. The type of operation will depend on the nature of the obstruction and the condition of the patient. Best results are obtained if the procedure is short and simple, with minimal trauma. Formidable resections and the correction of incidental pathologic conditions increase the morbidity and mortality.

Unless the site of obstruction is known, the best approach is through a right rectus incision, extending it if necessary. Tracing the dilated or undilated bowel will lead to the point of obstruction.

Simple division of an adhesion is often all that is necessary. The entire bowel should, however, be carefully examined. If there is extensive scarring, constriction of the lumen, or if the wall of the bowel was traumatized during lysis of the adhesion, resection should be performed. Resection is mandatory when there is

strangulation. The degree and irreversibility of strangulation is always a difficult problem. There are no absolute criteria; changes in color, peristalsis and pulsation of the mesenteric vessels must be considered. If after fifteen minutes of observation a decision cannot be made, resection should be performed. In mesenteric vascular occlusion, massive resection offers the patient his only chance of survival. Though the mortality rate is high, such resections are not incompatible with life. Following resection the continuity of the intestinal tract should be re-established by an end-to-end anastomosis. Dilated and edematous small bowel can generally be safely anastomosed. The method of anastomosis probably has little to do with the result; we prefer a closed aseptic technique. Rarely, because of advanced changes in the bowel or the condition of the patient, exteriorization is necessary. By-passing operations are occasionally required, especially if there are fistulae, inflammatory lesions or inoperable tumors.

Obstructed herniae require early attention, as a great many contain strangulated bowel. In femoral hernia, it may be advisable to undertake block resection of the sac and its gangrenous bowel, as described by Dennis and Varco (9).

Occasionally there is extreme distention of the bowel, preventing closure of the abdomen or manipulation of the bowel. Under these circumstances, an aseptic enterotomy and decompression with a tube can be performed. There are special tubes designed for this purpose, although a catheter or rectal tube is satisfactory.

Surgery in large-bowel obstruction

In the large bowel, because of the ileocecal valve, obstruction is usually of the closed-loop type and requires operative intervention. The danger of necrosis and perforation of a dilated, thinned-out colon, especially the cecum, is always imminent. Distention of the small intestine is not necessarily evidence of a patent ileocecal valve. Even in the presence of a patent ileocecal valve, it is well to remember that perforation of a dilated colon can occur.

The operation of choice for acute obstruction of the left colon due to carcinoma or diverticulitis is a loop colostomy performed in the right transverse colon. It is easily and quickly performed, because of the transverse mesocolon, and its location will not interfere with subsequent operations. Exploration at this time, save for a sweep of the finger over the liver, is contraindicated. There is great danger of traumatizing and perforating the dilated colon and little likelihood of determining the cause of the obstruction. Decompression by a tube within the proximal loop serves adequately until the colostomy is opened.

Tube cecostomy, for years advised, is unsatisfactory. It is usually difficult to perform aseptically. It will not divert the fecal stream and in most cases will not adequately decompress the colon. Mortality rates rise sharply when it is used in preference to colostomy (10, 11). Cecostomy may possibly be of use in the gravely-ill patient, but it should be followed by a colostomy at a later date.

The choice of operation for obstruction of the right colon due to carcinoma offers more latitude. If the condition of the patient is such that he will not tolerate more than the simplest procedure and the tumor is in the distal right

colon, a cecostomy is necessary. If the lesion is in the cecum and there is a patent ileocecal valve, a side-to-side ileotransverse colostomy, by-passing the obstruction, may be performed. A better procedure is an end-to-side ileotransverse colostomy, with exteriorization of the distal ileum. Then a catheter can be passed into the cecum, obviating a competent ileocecal valve and decompressing the cecum. A right colectomy with primary end-to-end anastomosis is desirable, provided the patient's condition is satisfactory. An anastomosis under such conditions may be successful, as it is performed in normal bowel.

Volvulus of the sigmoid without strangulation can be simply reduced. Resection is necessary if there is irreversible strangulation. This is often the procedure of choice, as there is a high recurrence rate. Primary re-establishment of the continuity of the colon in these cases is dangerous, as an anastomosis in a dilated, edematous and septic colon is followed by many complications.

Volvulus of the cecum without strangulation may also be treated by simple reduction. In view of its high recurrence rate, the mobile cecum should be fixed. This can easily be accomplished by a cecostomy, which will not only fix the cecum to the abdominal wall, but decompress it as well. If gangrene is present, resection with primary or delayed anastomosis can be performed.

Anesthesia

The choice of the anesthestic agent rightly belongs to the anesthesiologist. In general, it will depend on the condition of the patient and the type and duration of the operation. If the procedure planned requires little intra-abdominal manipulation, as in the case of colostomy or hernioplasty, local anesthesia is satisfactory. If warranted by the patient's condition, more extensive operations can be performed under local anesthesia. In such cases the parietal peritoneum may be anesthetized by pouring a diluted solution into the peritoneal cavity. Infiltration of the base of the mesentery will prevent the discomforts of traction on the bowel.

All patients with intestinal obstruction who require general anesthesia should have an endotracheal tube in place, because of the dangers of aspiration. Intubation may be carried out either while the patient is awake during topical anesthesia, or following induction with a rapid technique. In general, a light plane of anesthesia combined with administration of an adjuvant muscle relaxant is most successful in elderly patients who are likely to have pulmonary emphysema and cardiac irregularities.

SUMMARY

The experience at The New York Hospital in the treatment of aged patients with intestinal obstruction is analyzed. It is concluded that elderly patients with intestinal obstruction succumb more often as a result of shock and peritonitis than from the effects of old age. It is reasonable to assume that established and reliable treatment, instituted promptly, will reduce the mortality. The principles of treatment, including relief of the distention, correction of body deficits, use of antibiotics, and choice of operation and anesthesia are elaborated.

REFERENCES

1. NEMIR, P. JR.: Intestinal obstruction—Ten year statistical survey at the Hospital of the University of Pennsylvania, *Ann. Surg.* **135:** 367–375 (March) 1952.
2. FERGUSON, L. K.; SMITH, D. C., AND HOUSTON, P. C.: Intestinal obstruction in the aged, *Geriatrics* **4:** 341–352 (Nov.–Dec.) 1949.
3. CUTLER, C. W., JR.: Acute intestinal obstruction in elderly patients, *Surg. Gynec. & Obst.* **94:** 481–490 (Apr.) 1952.
4. MCLAUGHLIN, C. W., AND BRUSH, J. H.: Factors responsible for the improved results in the management of acute intestinal obstruction, *Arch. Surg.* **61:** 115–120 (July) 1950.
5. HOFFMAN, W. S.: The Biochemistry of Clinical Medicine. Chicago, The Year Book Publishers, 1954.
6. COLLER, F. A., AND BERRY, R. E. L.: Fluid and electrolyte balance in intestinal obstruction, *Minnesota Med.* **34:** 414–418 (May) 1951.
7. BLAIN, A., III.: Penicillin in experimental intestinal obstruction—A summary of observations with reference to their clinical application, *Surg. Gynec. & Obst.* **84:** 753–758 (Apr.) 1947.
8. NEMIR, P. JR.: Progress report on acute intestinal obstruction, *Am. J. M. Sc.* **223:** 198–203 (Feb.) 1952.
9. DENNIS, C., AND VARCO, R. L.: Femoral hernia with gangrenous bowel, *Surgery* **22:** 312–323 (Aug.) 1947.
10. ALBERS, J. H., AND SMITH, L. L.: A comparison of cecostomy and transverse colostomy in complete colon obstruction, *Surg. Gynec. & Obst.* **95:** 410–415 (Oct.) 1952.
11. WANGENSTEEN, O. H.: Intestinal Obstruction. A Physiological and Clinical Consideration with Emphasis on Therapy, Including Description of Operative Procedure, ed. 2. Springfield, Ill., Charles C Thomas, Publisher, 1942.

DIAGNOSIS AND TREATMENT OF SUBDURAL HEMORRHAGE IN THE VERY AGED*

MATTHEW T. MOORE M.D.†

Doctors Hospital, Philadelphia, Pennsylvania

Subdural hemorrhage occurs with greater frequency in the very aged than is generally suspected. It may escape detection in persons unable to give a history of head injury or not showing any obvious evidence of such trauma. This error is largely because of the tendency to consider the presenting condition as one of the more common brain lesions of later years, such as a vascular episode of thrombosis, intracerebral hemorrhage or embolism, primary cerebral neoplasm, metastasis to the brain, a metabolic disorder (*e.g.* diabetic coma), or a cerebral complication of cardiorenal disease and hypertension. Even when the diagnosis of subdural hemorrhage is suspected or established, all too often there is the untenable fatalistic attitude assumed by members of the family, and indeed by many physicians. They consider that the destiny of persons past 80 who have had a so-called "cerebral vascular accident" should not be challenged by operation because such patients have had more than their share of three score years and ten, and probably would survive but a short time in a state of suffering. Dublin (1) has shown that a female at age 80 has a life expectancy of 5.5 years and a male, an expectancy of 5.3 years, but a male at age 84 has an expectancy of 4.18 years. There may be some sentimental and even realistic justification on the part of relatives, the family physician or the surgeon to dismiss the thought of operation if the patient has been mentally and/or physically deteriorated for some time prior to contemplated surgery. This attitude should not apply to patients who have been enjoying active mental and physical health prior to the onset of the recent disability.

There has been a remarkable reduction in the mortality rate following major operations on aged individuals because of better preoperative and postoperative care, anesthesia, and attention to complicating disorders (2, 3). Despite this lowered mortality, there is still considerable reluctance on the part of relatives and even physicians to agree to intracranial surgery, largely because of the fear of a complicating hemiplegia or mental disaster. This is an inexcusable point of view, since without surgery cranio-cerebral injuries in the aged frequently result in the very issue feared by the family and physician, or the patient expires without benefit of surgical treatment. In discussing the methods by which the mortality from surgical procedures can be reduced in patients beyond the age of 80 Ziffren *et al.* (4) stated, "There are few operative procedures too hazardous to consider in this age group if the patient is properly prepared and is managed carefully during the operative and post-operative period."

* Presented at the Annual Meeting of the American Geriatrics Society, New York, N. Y., April 21–22, 1955.

† Address: 1813 Delancey Place, Philadelphia 3, Pa.

To illustrate the foregoing remarks, 2 cases are presented in which the patients, aged 81 and 84, had subdural hematomas successfully removed.

CASE REPORTS

Case 1

A. C., (admission #28310), an 81-year-old widow, was admitted to Doctors Hospital October 2, 1953 in coma, with the provisional diagnosis of cerebral thrombosis. The history given by a daughter disclosed that her mother had been in good health and that ten days before admission she had fallen down several steps and struck her head in the right occipital area. Although she bled profusely she did not lose consciousness, and withheld the information from her family and physician until October 10, at which time the patient called her physician because of headache. Medication was prescribed, but on the following day she slipped out of bed because of weakness of the left leg and left arm. She then began to show mental dullness, and lapsed into the semi-coma which prompted admission to the hospital. On admission examination, the chest and abdomen were grossly normal. Blood pressure was 130 systolic and 70 diastolic. An electrocardiogram was normal.

Laboratory studies showed a fasting blood sugar level of 133 mg. per 100 cc. The report of x-ray examination of the skull on October 14 read, "The pineal is calcified and it appears to be displaced slightly downward. It cannot be stated definitely whether there is any lateral pineal shift. . . . The calvarium appears intact and no neoplastic osseous invasion can be detected. There appears to be an artificial prosthesis within the left orbit. There appears to be opacification of the entire left maxillary sinus; however, no bone erosion of the maxillary bone is observed."

When examined by the author on October 14, a more detailed history revealed that weakness of the left arm had developed three days prior to admission to the hospital and that during the two days preceding admission there had been deepening coma and she had not responded to painful stimuli. There was a prosthesis in the left orbital fossa and it was impossible to examine the right fundus due to an operative coloboma and a small, rigid pupil which failed to respond to light stimulation. There was full motor power in the right arm and right leg and there was no weakness in the right side of the face. There was distinct weakness of the lower half of the left side of the face and considerable weakness of the left arm. The left leg moved equally as well as the right. The tendon reflexes of the upper and lower limbs were present and equal on both sides. The Babinski phenomenon was definitely present in the left foot and was suggestive on the right. When painful stimuli were applied to the limbs, the right leg, left leg, and right arm withdrew promptly, whereas the left arm did not respond. There was no evidence of meningeal irritation. On spinal puncture, the initial pressure of the cerebrospinal fluid was 176 millimeters. The fluid was faintly xanthochromic, and showed 14 cells per cu. mm.—9 polymorphonuclears and 5 lymphocytes. The concentration of total protein was 37 mg. per 100 cc.

In view of the history of a fall, a latent period of seven days with a clear sensorium, and then a slowly disordered consciousness, it was felt that subdural hematoma was the most likely diagnosis, despite the normal cerebrospinal fluid pressure and normal level of total protein. Since pupillary signs were obliterated by a prosthesis in one orbit and an operative defect in the other eye the only lateralizing signs were the weakness of the left side of the face and arm and the dominant left Babinski. It was suggested therefore that a burr hole be made over the right temporal area first, in anticipation of making bilateral openings, because of the possibility of ipsilateral or bilateral hematomas.

The following day under local procaine infiltration and sodium pentothal-oxygen anesthesia Dr. William T. Lemmon made a burr hole over the right temporal area, but no subdural hemorrhage was seen. A burr hole on the left side disclosed an extensive subdural hematoma with a well formed membrane (Fig. 1). When incised, a large quantity of chocolate colored blood escaped. The remainder was aspirated and flushed by catheter from the frontal, parietal, and temporal areas. The brain was compressed 2.5 cm.

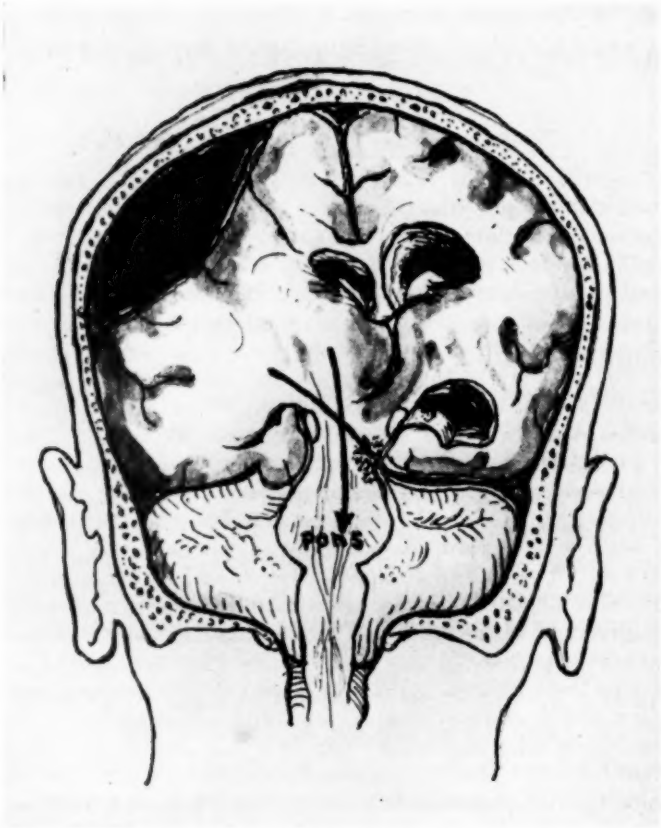


FIG. 1. Schematic illustration of the left subdural hematoma in Case 1 showing the direction of forces resulting in herniation of the left hippocampal gyrus and displacement of the right cerebral peduncle against the free edge of the tentorium, thus producing ipsilateral motor phenomena.

The day after operation the patient was responsive to questioning and showed improved motor power in the left arm and face. Two days later the patient lapsed into a semicomatose state and presented signs of meningeal irritation. On October 18 she was unresponsive and her condition was similar to that prior to operation. The operative wound was opened and adequate drainage established. Approximately 30 cc. of dark chocolate colored fluid escaped freely. Immediately following this the patient opened her eyes and responded actively to questioning. She improved for two days and on October 21 again lapsed into coma and had marked weakness of the right arm and face. From the time of the first craniotomy the temperature had risen to 103° F. rectally and there was evidence of pulmonary congestion. The patient had difficulty in taking food or liquid by mouth and was fed through a nasal stomach tube. She received penicillin-G-procaine (600,000 units three times daily) and oxytetracycline (500 mg. four times daily) through the tube. Total parenteral and oral liquids were restricted to 2500 cc. daily. One ampul of Solu-B (Upjohn) and 500 mg. of ascorbic acid were given daily by way of the intravenous fluids. Vitamin K was given in 20-mg. doses intramuscularly twice daily.

The members of the family, the family physician and the neurosurgeon were pessimistic regarding further exploration at this juncture, and financial considerations became pressing. However, with some persuasion, re-operation was permitted, and on October 21 the left craniotomy wound was re-opened and the temporal burr holes were enlarged with rongeurs.

Well formed clots of blood and dark chocolate colored fluid were removed, and bleeding from veins in the inferior and posterior temporal area was controlled by Bovie coagulation. A drain was inserted in the subdural space to allow for evacuation of any blood. Following each operative procedure intranasal oxygen was administered. On October 22 oxytetracycline was discontinued and replaced with sulfadiazine, 1 Gm. every three hours. On October 23, a transfusion of 500 cc. of whole blood was given. On October 24 the patient was responsive and there was free movement of the upper and lower limbs. She answered questions intelligently and was quite alert. On October 26 she was out of bed in a chair and was permitted to walk. On October 29 urinary incontinence developed. She was quite listless, but could be aroused. Spinal puncture on November 3 disclosed an initial cerebrospinal fluid pressure of 68 millimeters. The 2 cc. of clear colorless fluid which was removed contained 6 cells per cu. mm. The concentration of total protein was 26 mg. per 100 cc. X-ray examination of the chest disclosed a hazy density at the left base, which obstructed the left cardiac border and extended to the left lateral chest wall. The temperature at this time was 104° F.; blood pressure was 114 systolic and 70 diastolic, pulse 84, and respirations 28. Penicillin, which had been discontinued several days before, was again given in a dosage of 400,000 units every twelve hours. The following day the patient again was responsive and was able to take food by mouth. She improved progressively and was discharged November 14, 1953, able to walk unassisted and in full possession of her mental faculties and motor power. She has continued to be active both mentally and physically up to the time of the present writing.

Case 2

C. F., (admission #29214) an 84-year-old male, was admitted to Doctors Hospital February 3, 1954 with the history that on the previous day he had suddenly felt dizzy, his legs had given way and he had fallen, striking his right eyebrow and forehead. He was admitted to the hospital with a diagnosis of laceration of the scalp and possible brain concussion. The lacerations over the right forehead were sutured. Aside from the frontal injury the results of physical examination were entirely negative and laboratory findings were likewise within normal range. On the following day he was somewhat disoriented. However, the next day he seemed to be improved and attempted to get out of bed. During the succeeding four days he was occasionally restless and complained of pain over the right forehead. On February 12 he became drowsy and began to have difficulty in moving his left arm and leg. He required assistance in walking and getting out of the chair into bed. An x-ray film of the skull on February 5 showed no evidence of fracture or shifting of the pineal gland. Another film of the skull on February 15 was similar.

The patient was examined by the author on February 15. He was lethargic and could be aroused only with difficulty. There was mild weakness of the left corner of the mouth and the left arm and leg were distinctly weak, but the patient could move them slightly after repeated commands. The biceps and triceps reflexes on the left were more responsive than on the right. The patellar reflexes were diminished but equal. The Achilles reflexes could not be elicited on either side. There was a static Babinski phenomenon on the left side. There were no other pathologic responses. Pain perception appeared to be preserved throughout the body. Other forms of sensation could not be evaluated. There was a suggestive Kernig sign bilaterally. On ophthalmoscopic examination there was no evidence of choking of the discs. On spinal puncture the initial pressure of the cerebrospinal fluid was 60 millimeters. The 4 cc. of xanthochromic fluid removed for study showed 8 cells per cu. mm. The concentration of total protein was 94 mg. per 100 cc. The Wassermann reaction was negative, and results of the colloidal gold test were normal. The blood pressure on this date was 140 systolic and 82 diastolic, pulse 70, respirations 16, and temperature 99° F.

In view of the history of a fall, a latent period of several days with a normal sensorium followed by a period of progressive development of lethargy and left hemiparesis, and the finding of a xanthochromic spinal fluid with an increased concentration of total protein, a diagnosis of right subdural hematoma was made and exploratory trepanation was suggested.

The patient's two sons insisted that operation was inadvisable because of their father's advanced age and they withheld their consent. Only after repeated discussions with the sons did they grant permission to perform trepanation over the right side only. On February 17, 1954, fifteen days after the initial injury, a burr hole was made in the right subtemporal area. It was enlarged with rongeurs, and disclosed a plum colored dura, which was incised. An extensive subdural hematoma was seen. Another burr hole was made over the right occipital area and large quantities of well formed blood clots and dark chocolate colored fluid were removed by irrigation. The right cerebral hemisphere had been depressed approximately 3 cm. Semi-solid blood clots were removed from the inferior temporal area, throughout the frontal, parietal and occipital areas. Drains were inserted in the temporal and occipital openings and the operative wounds closed. The operation was performed by Dr. William T. Lemmon under local procaine infiltration and pentothal-oxygen anesthesia. Transfusions of 500 cc. of whole blood were given during and after operation.

The day following operation the patient was somewhat responsive and by February 20 he replied intelligently to questions and moved the left arm and left leg freely. On February 22 he was alert, cheerful and had full motor power in all extremities. The upper drain was removed and the lower withdrawn partially.

On February 23 he became lethargic in the evening and the left arm and leg were paretic. Projectile vomiting developed, and re-exploration of the subdural space was suggested. Both sons were adamant in their refusal to permit this procedure. Finally, after several conferences, permission was granted to explore only the posterior craniotomy opening. On February 25 the posterior burr hole was re-opened and enlarged slightly with rongeurs. There was a small amount of extra-dural clot. When the dura was incised the brain appeared edematous, and in the superior angle the exposed brain showed cortical laceration with hemorrhage. A small amount of subdural xanthochromic fluid escaped and a small subdural blood clot was removed.

On the day following this procedure the patient showed remarkable improvement, was alert, cheerful, and had free movement of the left arm and leg. Following the first and second operation he received oxygen at intervals, vitamin K intramuscularly, and polyvalent B vitamin plus ascorbic acid, 500 mg. intravenously daily. A total of 2500 cc. of fluids per twenty-four hours was not exceeded. In addition, a dose of 600,000 units of a penicillin preparation was given twice daily. Following the second operation a dose of 25 mg. of cortisone was given intramuscularly, twice daily, and after March 1, once daily. Physiotherapy in the form of massage, passive exercise and mild interrupted sine-wave galvanism to the left arm and leg was begun on March 1. On March 3 the patient complained bitterly of pain on urination. The temperature, which had been normal, rose to 102° F. by rectum on March 2, and to 102.8° F. on March 3. At this time sulfadiazine (1 Gm. with an equal amount of bicarbonate of soda) was given four times daily in addition to Crysticillin (600,000 units) intramuscularly once daily. On March 3 the urine was yellow, cloudy and acid, with a specific gravity of 1.022. There was no sugar, 1 plus albumen, occasional epithelial cells, and 35–40 white blood cells. A Foley catheter was inserted and the bladder was irrigated with neutral acriflavin. By March 5 the fever had subsided and on March 8 bladder irrigation was discontinued. From March 8 until his discharge from the hospital on March 19 he received 25 mg. of cortisone once daily by mouth, 1 cc. of vitamin B_{12} intramuscularly daily, 1 ampul of polyvitamin B plus 500 mg. of ascorbic acid intravenously daily, and a high-protein, high-vitamin, moderate-fat, moderate-carbohydrate diet. He improved steadily, was able to walk unassisted, was mentally alert, and had an excellent sense of humor. He was discharged from hospital March 19, 1954, and has maintained his improvement up to the time of the present writing.

DISCUSSION

In the very aged the diagnostic criteria for subdural hematoma are not invariably clear-cut and hence a history of trauma to the head should be conscientiously searched for, even though no obvious evidence of direct head injury

is present. The patient in Case 1 deliberately withheld the information about a head injury, even from her physician, until close questioning finally disclosed it. The diagnosis of cerebral thrombosis had been made prior to securing the facts. Without the key knowledge of an antecedent head injury, the sequence of a fairly rapid onset of lethargy and coma and positive neurologic findings could very well indicate the presence of an intracranial space-occupying lesion or some cerebral vascular ictus. In Case 2 there was a frank history of head injury, with objective evidence. Meredith (5) reported 2 cases of chronic or subacute subdural hematoma due to indirect head trauma following a fall on the buttocks, and cited similar cases from the literature (6–8). Such falls among the very aged are common and their occurrence should be sought for in the history-taking. As in Case 1, there may be many aged persons who fail to disclose the fact that they have had a direct head injury or a fall on the buttocks, either because they consider it inconsequential, have forgotten about it, or are unwilling to disturb the members of their family.

Bergman *et al.* (9) reported 100 consecutive cases of suspected subdural hematomas among persons having head injuries, and observed that there were no reliable clinical features distinguishing the group of 67 patients who had subdural hematomas from the 33 who did not. The suspected diagnosis of subdural hematoma proved correct in two thirds of the cases, when these authors used as criteria the combination of head injury, changes in consciousness, and failure to improve. Stein (10), who reported 15 cases of suspected subdural hematoma, noted that among the cases in which it was found, no specific syndrome could be considered pathognomonic. Physical findings varied from complete absence of signs to pronounced one-sided motor weakness and aphasia; moreover, whereas the sensorium was completely clear in some, in others there was extreme drowsiness or coma. Among somewhat younger patients admitted to the hospital, the additional evidence of brain contusion or laceration, alcoholic encephalopathy, hypertension, diabetic ketosis, cerebral arteriosclerosis, pulmonary tuberculosis, and various psychoses (10) complicated and beclouded the diagnosis.

Wortis *et al.* (11) studied 50 cases of surgically proven subdural hematomas and stated that some mental disturbances, varying in degree from slight to severe, occurred in all patients with acute subdural hematomas, and that some patients with minimal neurologic disturbances often have marked mental changes. They felt that progression of neuropsychiatric signs is the most important diagnostic feature of acute subdural hematoma. Approximately 25 per cent of patients have a history of irritability and behavioral disturbances, and as many as 30 per cent may have convulsive seizures (9). There are many patients who, for a period of several days or weeks, recover from their initial injury to the brain proper and then lapse into varying degrees of drowsiness within one to several weeks following the original injury. Such patients can have very large collections of subdural blood, but will not always present the clinical aspects of an acute, subacute or chronic subdural hemorrhage. Unless one is constantly on the alert, the patient may succumb to a lesion which might have been amenable to surgery.

Examination discloses disorders of consciousness as the outstanding feature. Pupillary findings are inconstant, dilatation appearing in at least 25 per cent of cases. The dilated pupil appears most frequently on the side of the hematoma but may occur almost as often on the opposite side (12). The presence of papilledema is helpful but its absence does not exclude the diagnosis. Choked disc is found in about one fifth of the cases. Reflex activity likewise shows no uniformity in pattern. Patients with unilateral subdural hematoma may show normal plantar reflexes, and unilateral or bilateral Babinski phenomena, but much the same pattern is found in those with bilateral hematoma. Additional neurologic signs may be present in the form of motor weakness manifested as monoplegia, hemiparesis or hemiplegia and quadriparesis; hemisensory defects (often not reliable because of clouding of consciousness); aphasia; visual field defects; absent abdominal reflexes; and a shifting from side to side of the abnormalities especially the pupillary and reflex changes. It is more or less generally conceded that, from unilateral or bilateral neurologic signs, one cannot accurately differentiate bilateral from unilateral hematomas, nor can one predict on which side a unilateral hematoma may be (9). Case 1 illustrates the unreliability of hemiparesis as a guide to the site of the hematoma. The ipsilateral motor and reflex phenomena in this case can be explained by the pressure of the hematoma and usual attendant swelling (13) of the underlying cerebral hemisphere. This caused herniation of the ipsilateral uncus through the incisura and displacement of the brainstem to the opposite side, with consequent impingement of the contralateral cerebral peduncle against the edge of the adjacent tentorium (Fig. 1).

Examination of the cerebrospinal fluid with respect to pressure, color, the presence of blood, and total protein content may yield more information. The only positive finding in the cerebrospinal fluid in Case 1 was xanthochromia, and in Case 2, xanthochromia and an increased concentration of protein. The pressure was normal in both instances. In over 80 per cent of cases there will be xanthochromia, bloody fluid, increased pressure, and/or an elevated concentration of protein. On the other hand, subdural hematoma may be present with completely normal cerebrospinal fluid findings (9). These data, however, do not help in differentiating subdural hematoma from other intracranial lesions.

Carotid angiography in cases of subdural hematoma has disclosed a characteristic pattern, *viz.*, in the antero-posterior views of the arterial phase, there is a peripheral avascular space and a shift of the anterior cerebral artery to the opposite side (9, 10, 14, 15).

It has been somewhat generally accepted in the past that the electroencephalographic findings associated with unilateral subdural hematoma consisted of an ipsilateral reduction in amplitude of the alpha activity and/or a slow-wave delta focus (16–18). However, more recent studies of large numbers of cases indicate that there are no characteristic electroencephalographic patterns in subdural hematoma and that the various types of brain injury can not be differentiated unequivocably by an electroencephalogram (9, 19).

In the very aged, and in some younger subjects, the use of such ancillary aids to diagnosis as carotid angiography and pneumoencephalography may be hazardous, and electroencephalography may not be available. A more cogent

reason for not using these methods in every case is that delay may cause the loss of a patient. Under these circumstances the relatively simple and innocuous procedure of exploration by means of burr holes will afford a diagnosis, and by enlargement with rongeurs the appropriate treatment of evacuation of the subdural hemorrhage can be readily accomplished. Even in the very aged the modified approach of Chambers (20), in which a wider subtemporal opening is made, may be carried out with impunity. This procedure affords greater access to bleeding veins or sinuses, and the bleeding can be controlled by electro-coagulation, gelfoam or muscle tissue.

Because of the frequency with which subdural hematomas occur bilaterally, it is advisable to make an exploratory burr hole on the opposite side even when hemorrhage is disclosed on the side first explored. Bilateral hematomas should be evacuated and drained at the same time; otherwise the removal of only one hematoma may cause a shift of the brainstem to the opposite side, with serious or fatal consequences (21). Repeated evacuation of clots or aspiration of bloody fluid from the subdural space may be necessary for a satisfactory outcome (22). Both cases presented here amply illustrate this point, plus the need for courageous insistence upon repeated exploration if the clinical evidence warrants it.

Although both of the patients concerned in this report made a complete recovery without postoperative disability, the mortality among patients operated on for subdural hematoma may vary from 23 per cent (9) to 35 per cent (12). The survival rate is influenced by the presence of associated cerebral damage, and by the degree to which a patient becomes or is permitted to become comatose prior to the evacuation of the subdural hematoma (12). Both patients were operated on shortly after the onset of a change in consciousness. In Case 1 there was no evident damage to the brain proper but bleeding persisted from deeply situated veins in the temporal area. The brain in Case 2 was lacerated and bleeding and the bleeding was controlled at re-operation.

There was no postoperative morbidity in these 2 patients, despite their advanced age. Nevertheless there is morbidity in about one fifth of surviving patients who have been operated on for subdural hematoma (9). This may be due to the natural course of the disorder, attendant brain injury or disease, complicating diseases, or delay in operation. It seems reasonable that, with an increasing awareness of the clinical features of subdural hematoma, undelayed operation, and the use of modern methods of diagnosis and medical care, both the mortality and morbidity rate of subdural hematoma in the aged will be reduced.

SUMMARY AND CONCLUSIONS

Two cases of subdural hematoma in patients aged 81 and 84 are reported. There was complete recovery following repeated removal of subdural blood.

The treatment of subdural hemorrhage in the very aged, to be successful, must encompass the "total" approach. This includes: 1) diagnostic awareness of the condition, 2) the selection of appropriate surgical methods, 3) preoperative and postoperative attention to the physiologic requirements of the aged as regards water and electrolytes, 4) maintenance of nutrition by proper oral and/or paren-

teral substances, 5) correction of hemic imbalances, 6) care of pre-existing or complicating medical disorders, and 7) careful watch for further bleeding, occasionally necessitating repeated evacuation of subdural clots.

Acknowledgment

Grateful acknowledgment is extended to Dr. Henry V. Marvel for permission to report the case material.

REFERENCES

1. Dublin, L. I.: Longevity in retrospect and in prospect, *in* Cowdry, E. V.: Problems of Ageing, ed. 2. Baltimore, The Williams & Wilkins Co., 1942, Chap. VI.
2. Ziffren, S. E., and Cullen, S. C.: Principles in the management of the aged surgical patient, *J. Am. Geriat. Soc.* **2:** 32 (Jan.) 1954.
3. Carp, L.: Common problems in geriatric surgery, *Geriatrics* **6:** 100 (Mar.–Apr.) 1951.
4. Ziffren, S. E.; Zager, L. L., and Cullen S. C.: Hazards of surgery beyond the age of eighty, *Geriatrics* **5:** 252 (Sept.–Oct.) 1950.
5. Meredith, J. M.: Chronic or subacute subdural hematoma due to indirect head trauma; report of 2 cases, *J. Neurosurg.* **8:** 444 (July) 1951.
6. Peet, M. M.: Extradural hematoma, subdural hematoma, subdural hydroma, *in* Injuries of the Skull, Brain and Spinal Cord: Neuro-psychiatric, Surgical, and Medico-Legal Aspect, ed. 2, S. Brock, Ed. Baltimore, The Williams & Wilkins Co., 1943, p. 134.
7. Davis, L.: The Principles of Neurological Surgery, ed. 3. Philadelphia, Lea & Febiger, 1946, p. 99.
8. Léchelle, P.; Petit-Dutaillis, D., and Thévenard, A.: Hématome sousdural post-traumatique sans traumatisme direct de la tête. Trépanation. Guérison, *Bull. et mém. Soc. med. d. hôp. de Paris* **62:** 45, 1946.
9. Bergman, P. S.; Nathanson, M., and Friedman, E. D.: Results of exploration in patients with clinical diagnosis of subdural hematoma, *J.A.M.A.* **149:** 1529 (Aug. 23) 1952.
10. Stein, J. M.: Cerebral angiography in diagnosis of subdural hematoma, *Neurology* **2:** 389 (Sept.–Oct.) 1952.
11. Wortis, S. B.; Herman, M., and London, J.: Mental changes in patients with subdural hematomas, *Res. Publ. A. Nerv. & Ment. Dis.* **24:** 274, 1945.
12. Echlin, F.: Traumatic subdural hematoma—acute, subacute and chronic; analysis of 70 operated cases, *J. Neurosurg.* **6:** 294 (July) 1949.
13. Browder, E. J., and Rabiner, A. M.: Role of intracerebral swelling in subdural hematoma, *Tr. Am. Neurol. A.* **76:** 117, 1951.
14. Wickbom, I.: Angiography in post-traumatic intracranial hemorrhages, *Acta radiol.* **32:** 249, 1949.
15. Lima, P. A.: Cerebral Angiography. London, Oxford University Press, 1950.
16. Gurdjian, E. S., and Webster, J. E.: Traumatic intracranial hemorrhage, *Am. J. Surg.*, **75:** 82 (Jan.) 1948.
17. Jasper, H. H.; Kershman, J., and Elvidge, A.: Electroencephalographic studies of injury to the head, *Arch. Neurol. & Psychiat.* **44:** 328 (Aug.) 1940.
18. Smith, G. W.; Mosberg, W. H.; Pfeil, E. T., and Oster, R. H.: Electroencephalogram in subdural hematoma, with review of literature and presentation of 7 cases, *J. Neurosurg.* **7:** 207 (May) 1950.
19. Levy, L. L.; Segerberg, L. H.; Schmidt, R. P.; Turrell, R. C., and Roseman, E.: The electroencephalogram in subdural hematoma, *J. Neurosurg.* **9:** 588 (Nov.) 1952.
20. Chambers, J. W.: Acute subdural hematoma, *J. Neurosurg.* **8:** 263 (May) 1951.
21. Voris, H. C.: Cranio-cerebral trauma, *in* Clinical Neurology, ed. by A. B. Baker. New York, Hoeber-Harper, 1955, Chap. 17, p. 1019.
22. Cohen, I., and Elsberg, C. A.: Chronic subdural accumulations of cerebrospinal fluid after cranial trauma, *Arch. Neurol. & Psychiat.* **18:** 709 (Nov.) 1927.

DIAGNOSIS AND TREATMENT OF PAIN IN THE ACROMIO-CLAVICULAR JOINT*

CHARLES V. HECK M.D. AND FREMONT A. CHANDLER M.D.†

Department of Orthopaedic Surgery, University of Illinois Research and Educational Hospitals and St. Luke's Hospital, Chicago, Illinois

Shoulder lesions as a group are seen in a large number of patients in our zone of practice in orthopaedic surgery. The discomfort and disability are often major and of long duration. The division of shoulder lesions into distinct categories is difficult and sometimes impossible. Multiple anatomic areas may be producing symptoms about the shoulder simultaneously, thus putting the clinician to a real test in diagnosis. Treatment of shoulder pain is varied and controversial. This is largely due to inaccurate diagnosis, severity of the pathologic condition or lack of cooperation by the patient. General factors such as obesity, advanced age, reduced activity and residual ancient trauma influence the results. The geriatric patient will sometimes complain of pain in the shoulder following a fall on the outstretched hand. Our attention to the shoulder is apt to be minimal when attention is focused on injuries such as fractures about the wrist or elbow. Weeks later the shoulder suddenly becomes the major source of complaints, often after the other injuries have been managed successfully. Forced prolonged bed rest as treatment for cardiovascular and other disorders may precipitate pain in a previously asymptomatic shoulder lesion.

ANATOMIC CONSIDERATIONS

Of necessity, one has to be vague in describing the shoulder as a distinct unit of the anatomy. It is merely a segment in the forequarter comprising the neck, chest, shoulder and upper extremity. Three joints make up the suspension mechanism of the upper extremity, each with peculiar purposes (1).

1. The sterno-clavicular joint is the most remotely placed of the group, yet it represents the only bony connection of the extremity to the trunk. It participates in all motions of the shoulder girdle.

2. The acromio-clavicular joint is only as stable as its many ligamentous suspensions are efficient. It is capable of many developmental variations, some of which are precursors of symptoms later in life. This joint contains a disc which varies in size and arrangement and is most susceptible to wear and tear, trauma or disease. The shape of the end of the clavicle determines the size of the joint surface and to some degree the mobility throughout the articulation. Most motions of the shoulder also involve this joint.

3. The scapulo-humeral joint is inadequate from an engineering standpoint. However, when it is supported by normal soft-tissue structures it is stable and

* Presented at the Annual Meeting of the American Geriatrics Society, New York, N. Y. April 21–22, 1955.

† Deceased, December 24, 1954.

capable of great excursion in motion. Numerous bursae about the joint aid in maintaining good motion under normal circumstances.

Nerve roots emerging from the cervical spine below the level of C-III may be irritated by lesions along their course, causing referred pain into the shoulder and arm.

CLINICAL DIAGNOSTIC PROCEDURE

The patient is examined with respect to cranial nerve lesions. Motion of the cervical spine is tested and care is exercised to estimate the degree of restriction. In elderly patients there is a gradual decrease in the ability to rotate the neck or bend it laterally. If pain is elicited by motion of the neck, manual traction on the head and neck with the patient in a sitting position will aid in the analysis of signs originating in the cervical spine. On the other hand, referred pain may actually be accentuated by passive motion of the head and neck. Determination of the reflexes in the biceps, triceps, and wrist extensor muscles is helpful. Coughing or sneezing or holding a deep inspiration of air may raise intrathecal pressure enough to reproduce pain, and thus aid in locating lesions proximal to the foramina. The strength of the muscles about the neck, shoulders, and the rest of both upper extremities, should also be tested.

The sterno-clavicular joint area is apt to show local thickening, crepitation and tenderness, when it is the source of the symptoms. Radiation of pain to other areas is at a minimum. Pain is influenced by active motion of the shoulder or by passive depression of the medial end of the clavicle toward a posterior position. Pain is sharp, is made worse by activity, but is improved by rest.

Acromio-clavicular joint lesions may be noted by observation. Local thickening of soft tissues or actual bone proliferation will produce a local prominence. A displaced disc can produce a similar prominence. There is local tenderness over most of the joint available to the palpating finger. However, the tenderness can be greater over the anterior than the posterior portion of the joint, or vice versa. Active and passive abduction reproduce the pain at the point of compression of the joint—usually in the zone of 60–70° of abduction. Extremes of rotation through the scapulo-humeral joint produce pain in the irritated acromio-clavicular joint. Pain is apt to radiate to the lateral aspect of the neck and to the pectoral, scapular, deltoid, lateral arm, lateral epicondyle and forearm extensor regions, in a variety of combinations. Referred pain of this type is best described as an "ache" and occurs at night or during a period of prolonged rest. Sharp pain of short duration occurs with active motion during the day. History may reveal a sprain, subluxation or actual separation of the joint earlier in life.

The shoulder region will show the following findings in lesions in the subdeltoid area or rotator cuff: local tenderness in the region of the greater tuberosity, muscle spasm varying from slight to marked splinting of the extremity, and limited passive and active motion of the gleno-humeral joint. The patient may support the afflicted extremity with his normal one. Pain is referred to the various areas previously mentioned in pathologic conditions of the acromio-clavicular

joint. The term "bursitis" is frequently used to indicate inflammation of the subdeltoid bursa along with the nearby tendinous structures (supraspinatus). The word "bursitis" tends to be used carelessly in lay and medical groups alike.

Bicipital groove tendinitis causes tenderness along the anterior aspect of the upper humerus over the tendon, sometimes as a result of injury or recurrent subluxation or dislocation of the tendon. Some muscular spasm may be present. Limitation of motion is noted but is variable. One of our cases demonstrated a dual bicipital tendon that was buried in chronic inflamed synovial-like tissue—a developmental anomaly.

Periarthritis is a term used to denote generalized degenerative processes about the shoulder joint, and is an osteo-arthritis. It is seen in geriatric patients, particularly in the laboring groups. The changes are the results of repeated heavy insults to the various joint structures. Symptoms are variable. Other lesions of metastatic nature must be ruled out. Pleural and cardiac causes of shoulder pain must be kept in mind.

ROENTGENOGRAPHIC FINDINGS

Roentgenograms should always show both shoulders. We would hesitate to comment on a chest x-ray film showing only one lung. Calcific deposits may be seen in soft tissues, particularly in the region of the insertion of the supraspinatus tendon. Changes in articular surfaces vary from none to advanced proliferative processes. The acromio-clavicular joint may be narrow and may show a variety of irregularities of opposing joint surfaces—proliferation, or pitting of the end of the clavicle or of the opposing surface of the acromion.

Any films of the various lesions must be interpreted in the light of clinical observations. The presence of calcific deposits in the subdeltoid area does not indict that area, in the absence of clinical findings.

TREATMENT

Relief is available for nearly all who complain. The treatment of acromio-clavicular joint disorders may be approached in several ways. Overtreatment can be serious and must be avoided. Local infiltration of the joint with from 1 to 2 cubic centimeters of a local anesthetic agent affords immediate relief in many patients. When relief is immediate, diagnostic confirmation is gained and some patients have been started toward recovery of function. When symptoms persist, repetition of the injection may bring about the desired result. Adrenocortical derivatives are of little or no value in these lesions; pain is often made worse by such injections. Heat is good treatment for some shoulder lesions but may increase discomfort in acromio-clavicular joint disorders. Its use should therefore be discouraged in such instances. Circumduction exercises, although effective in rotator-cuff and other pathologic conditions, tends to maintain irritation in a highly painful acromioclavicular joint lesion. It should be used cautiously, if at all. If motion of the shoulder is structurally restricted after a long period of pain, then a search should be made for causes other than irritation in this little joint.

It was uncommon in our series to see a "frozen" shoulder as the result of an isolated acromio-clavicular change. Persistent shoulder pain over several weeks is more characteristic of acromio-clavicular joint pathology than of other shoulder lesions. Subdeltoid pain subsides eventually, without treatment, more frequently than does acromio-clavicular pain. Physiotherapy devices have been generally disappointing in our hands. Diathermy, massage, and various forms of heat may actually enhance symptoms. Such therapeutic agents may be used only when local infiltration has failed and when they do not aggravate symptoms. In the small percentage of patients in whom conservative therapy is unsuccessful, surgical treatment will give a satisfactory result. The distal $\frac{5}{8}$–$\frac{3}{4}$ inch of the clavicle is resected, preferably under general anesthesia. The approach is through a 2–3 inch segment of the Codman shoulder strap incision (2, 3). Resection is extraperiosteal and lateral to the coraco-clavicular ligament structures. Full benefit of the surgical management is usually realized in ten to thirty days following the resection. Active use of the extremity is encouraged, immediately following operation. A sling is the only immobilizing apparatus employed.

SUMMARY

Lesions of the acromio-clavicular joint produce symptoms similar to those noted elsewhere in the shoulder. Diagnosis can be overlooked when attention is drawn in a roentogram to calcific deposits in adjacent soft tissues, or when examination is incomplete.

Treating shoulder pain empirically as a subdeltoid lesion does not give satisfactory results in true acromio-clavicular joint disorders. Most cases improve with conservative measures, and resection of the distal end of the clavicle is of great value in those cases resistant to other forms of therapy. Overtreatment should be avoided. Roentgen therapy was not indicated in any of our cases. Diathermy and other forms of heat increased discomfort in over half of our series, and circumduction exercises were harmful in two thirds of the cases. Operative treatment was necessary in about 5 per cent of our patients, but at no time were surgical fixation procedures considered, even for long-standing derangements of the acromio-clavicular joint in the geriatric age group.

REFERENCES

1. Inman, V. T., and Saunders, J. B. de C. M.: Observations on the function of the clavicle, *California Med.* **65:** 158–166, 1946.
2. Mumford, S. B.: Acromio-clavicular dislocation: a new operative treatment, *Bone & Joint Surg.* **23:** 799–802, 1941.
3. Gurd, F. D.: The treatment of complete dislocation of the outer end of the clavicle; a hitherto undescribed operation, *Ann. Surg.* **113:** 1094–1098, 1941.

HISTAMINE AS A STRESS-COMBATING AGENT IN THE TREATMENT OF RHEUMATIC DISEASE

IRVING B. PERLSTEIN, M.D.

Department of Medicine, University of Louisville, School of Medicine, Louisville, Kentucky

A clinical study of the use of histamine in various rheumatic diseases was initiated by the author in 1948. This study had its origin in the initial observation that when aqueous histamine was injected intracutaneously into multiple circumscribed sites over a single painful joint, there followed relief of joint pain and a generalized sense of well-being. Following this observation, 65 patients were treated with histamine. The results of this treatment form the subject of this report.

Histamine has been known since 1907, when it was prepared synthetically by Windaus and Vogt (1). In 1910 it was isolated from ergot by Barger and Dale (2). In 1927 Best and his associates (3) demonstrated its presence in living tissue. Very little therapeutic value was attributed to histamine until 1927 when Horton, appreciating its therapeutic possibilities, used it in a wide variety of apparently dissimilar disorders and found for it a wide field of usefulness. Since that time there has been a sustained and gradually increasing interest in histamine as a drug of therapeutic importance in several unrelated disorders.

In the intervening twenty-five years, many bits of information, both suggestive and definitive, have been added to our basic knowledge of histamine. Its pharmacologic properties suggest a usefulness in a very broad clinical field. No attempt will be made in this paper to review the tremendous literature on histamine. There are several large and comprehensive reviews on the subject (4–6).

Histamine is found in practically every human tissue except that of the central nervous system (7). It is a normal constituent of the blood and it is found chiefly in the granular series of leukocytes.

The pharmacologic actions of histamine are several:

1. It dilates the arterioles, venules and capillaries in man.
2. Intra-arterial injections of histamine induce a sudden and dramatic increase in capil lary permeability in the tissue supplied by the artery in question.
3. An intradermal injection of histamine causes a dilatation of the capillaries in direct contact with the drug, a diffuse flair due to dilatation of surrounding arterioles, and an area of edema.
4. Following administration of histamine there is an increase in heart rate, and a fall in blood pressure in a normal individual; in addition, there is a marked increase in the oxygen saturation of venous blood—from an initial 60 per cent to about 94 per cent. The venous blood thereupon assumes an arterial character. Jonez (8) found that a repository type of histamine would keep the oxygen content of venous blood at arterial levels for an average of forty-eight hours.
5. The action of histamine on the glands of internal secretion can only be postulated. It is a well known fact that histamine causes release of epinephrine from the medulla of the adrenal. This can be demonstrated in cases of pheochromocytoma and may be used as a

test for this tumor (9). A rather abrupt rise in blood pressure is noted, due to an outpouring of epinephrine.

6. The effect of histamine on the adrenal cortex can be measured by the circulating eosinophil response (10). In most patients whom we treated successfully with histamine, a prompt drop in the eosinophil count (average, 50 per cent) at the end of one hour was noted. This response is considerably more rapid than that observed following administration of either ACTH or cortisone, as demonstrated earlier by Jonez (6).

METHODS AND MATERIALS

Histamine in aqueous solution was administered intracutaneously over a single painful joint, primarily to secure an increased circulatory response, as manifested by local comfort and warmth lasting twelve to twenty-four hours after an injection. Later in the course of the treatment of patients with multiple joint involvement our attention was drawn to general and systemic effects, characterized by a generalized feeling of well-being and relief in joints other than the one being treated.

The duration of our course of treatment varied according to the acuteness or chronicity of the disorder. On the whole, we found that rheumatic involvement of acute and recent onset tended to respond sooner than the old chronic disorders with established degenerative changes. It was our consistent observation that dramatic improvement, with relief of pain and restoration of mobility, followed a moderately severe histamine reaction. We, therefore, induced this reaction with gradually increasing doses of aqueous histamine.

The 65 patients reported in this study received histamine treatments in the office. They presented a cross-section of various rheumatic diseases, both articular and non-articular. A complete history was taken and a physical examination made, including x-ray films of the affected parts. In addition, the erythrocyte sedimentation rate was determined and a complete blood count was performed. During the course of the histamine study, circulating eosinophil counts were performed by the method of Randolph (11), three times on each patient before and after treatment.

The material used was an aqueous solution of histamine and procaine containing 1.25 mg. of histamine base and 50 mg. of procaine by volume per cc. The initial dose in a robust individual was 0.15 cc. In older people, an initial dose of 0.05 to 0.10 cc. was used. Patients with acute severe incapacitating pain (*e.g.*, bursitis or tendinitis) received daily injections until distinct relief was obtained. Such relief usually occurred within three to five days. In some individuals, however, marked relief was noted after only one injection.

The dose was increased daily by 0.05 cc., until a satisfactory response was noted. Treatment was then continued at this dosage level three times weekly for two to four weeks, followed by treatment once weekly as long as continued improvement was being achieved. When a plateau in improvement was reached treatment was discontinued and the patient told to return if symptoms recurred. Often two or three treatments at the beginning of a recurrence sufficed to abort the full attack of pain and limitation of movement.

An average maximal dose of 1 cc. was given in order to induce a satisfactory

histamine response, but several patients could tolerate as much as 2 cc. The response was characterized by a moderate, generalized flush beginning over the face and neck and spreading gradually to the rest of the body. This was usually accompanied by tachycardia and headache. As it subsided, there followed a sense of well-being, release from tension, and general relaxation, and many of the patients fell into a sound sleep. On wakening, about twenty minutes later, they mentioned a feeling of increased vigor, and some patients spoke of increased muscular strength following treatment.

There were two distinct groups of patients in this series. The most dramatic results were achieved in the group with non-articular rheumatic disorders, which included tendinitis, tenosynovitis, bursitis (both calcified and uncalcified) and capsulitis. The remaining patients manifested the articular changes of rheumatoid arthritis (atrophic) or osteoarthritis (hypertrophic). Of the latter group, all responded well, but not so dramatically as the non-articular group. However, there were 4 patients with atrophic arthritis who did not respond, and they were classified as failures. Several typical cases are briefly summarized.

CASE REPORTS

Miss F. B., aged 38, white, single, had a history of sudden attacks of severe pain in the right shoulder while bowling in November 1951. There was marked limitation of movement to not more than 10 degrees. Because of the constancy of the pain, she had been sleepless for three nights before treatment was begun. X-ray examination showed a large area of calcification in the right subacromial bursa. The red cell sedimentation rate was 32 mm. per hour. The eosinophil count before treatment was 320 per cu. mm.; after treatment with 0.15 cc. of histamine solution, the eosinophil count was 110.

This patient received three treatments on three successive days, with 0.15 cc., 0.20 cc., and 0.25 cc., respectively. At the end of the third treatment, motion without pain had increased up to 50 per cent. She received a total of twelve injections in three weeks; the maximum dose was 0.65 cc. At the end of this time the pain had completely disappeared, and there was no limitation of movement. The sedimentation rate returned to normal and an x-ray film showed no evidence of the calcified bursa. She has remained symptom-free to date.

Mrs. H. C. S., a 42-year-old white female, was seen on December 15, 1952, complaining of severe pain in the right shoulder with extreme limitation of motion. In 1949, x-ray therapy for right-shoulder bursitis had produced complete relief. In August 1952, x-ray therapy for bursitis of the right hip also produced complete relief. However, x-ray therapy for a recurrence of the right-shoulder bursitis in November 1952 had provided no relief. Initial examination revealed a *hot, tender and swollen right shoulder* with only 15-degree abduction. The red cell sedimentation rate was 10 mm. per hour. The eosinophil count per cu. mm. was 450 before treatment, and 50 after treatment. X-ray examination showed marked calcification in the capsule of the right shoulder joint.

Treatment was begun with 0.15 cc. of histamine solution and by the *second treatment the swelling was materially reduced.* By the fourth treatment, the pain was considerably diminished. In two weeks, she had regained 75 per cent motion in the shoulder joint. During this time she received nine injections. One month after beginning the treatment, during which time a total of fifteen histamine injections had been given, there was complete recovery of motion and complete freedom from pain. The x-ray film showed no demonstrable change in the calcification.

Mrs. J. T., a 47-year-old white female, complained of a sudden attack of left-shoulder pain and severe limitation of movement. The red cell sedimentation rate was 19 mm. per

hour. The eosinophil count per cu. mm. was 226 before treatment, and 120 after treatment. On x-ray examination, there was no demonstrable calcification.

She was treated on three successive days with doses of 0.15 cc., 0.20 cc., and 0.25 cc. respectively of histamine solution over the painful area. Pain was noticeably relieved after the third treatment and totally relieved after the fourth treatment, with restoration of complete range of motion.

Mrs. K. C. G., a 75-year-old white female, was first treated in 1949. She had been involved in an automobile accident in 1938 with injury to both knees. There had been a progressive increase of pain and stiffness in the knees until 1946, when she had to walk with cane and crutch. She spent most of each night awake because of pain in both knees. The red cell sedimentation rate was 42 mm. per hour. The eosinophil count per cu. mm. was 450 before treatment and 150 after treatment. X-ray examination showed marked degenerative changes in both knees.

After six histamine treatments in ten days she stated she was more comfortable at night. After one month (fourteen injections), she had no night pain. After three months (thirty-six injections), she was able to walk without cane or crutch, and is still doing so. It is interesting to note that this patient received a maximum dose of 0.35 cc.

Mrs. J. R. was a 68-year-old female with a 25-year history of progressively severe pain in both knees. Even the slightest motion was extremely painful. She had previously experienced all the usual routine treatments, including gold and cortisone, with no improvement. She could walk only with the aid of canes, and her knees were maintained in an attitude of 15 degrees flexion, never becoming fully extended, not even in bed. X-ray examination showed marked and severe degenerative changes in both knees. The red cell sedimentation rate was 10 mm. per hour. The eosinophil count per cu. mm. before treatment was 350, and after treatment 100.

Treatment was begun with 0.10 cc. of histamine solution, and this was gradually increased until after the fourteenth treatment her dose was 1 cc. three times weekly. At this level the patient stated she felt considerably better, was free of night pain, and was able to straighten out her legs in bed. Her regular intracutaneous injections were then supplemented with a repository type of histamine.[1] The patient volunteered that this increased the benefit which she obtained from the treatment. The intervals between injections could thus be gradually lengthened until she was getting one treatment per week. This schedule was maintained for three months. At this point she felt comfortable enough to pursue her normal activity without being conscious of her knees. She remained without treatment for three weeks, until one day when she climbed 80 steep steps because an elevator had failed. There was a severe recurrence of her earlier symptoms. Treatment was restarted with 1 cc. three times weekly, without significant relief. The dose was therefore increased gradually to 1.4 cc., at which level she experienced a therapeutically satisfactory histamine reaction (dizziness, headache, and rapid pulse). The next day she noted marked improvement. It was then possible to increase rapidly the interval between treatments. Twelve weeks after the relapse she was discharged. For three months she has had no pain, and is able to undertake more in the way of physical activity than in the preceding four years. In her own words—"For the first time in three years I am able to do my own Christmas shopping."

Mr. J. S., a 70-year-old white male, had a history of arthritis in his back and hips for over thirty years. He came to us after having received cortisone for three months without benefit. He stated that he was comfortable either lying in bed or standing still, but that sitting in a chair was exceedingly painful. Because of limitation of movement, positional changes were both extremely uncomfortable and difficult. The red cell sedimentation rate was 36 mm. per hour. The eosinophil count per cu. mm. was 200 before treatment and 50 after treatment. X-ray examination revealed a poker spine and almost complete obliteration of the sacro-iliac joints.

[1] Histapon®, histamine phosphate (2.75 mg. per cc.) in a menstruum of peanut oil and oxycholesterol derivatives, was supplied by Dr. Edward A. Barrett, Medical Director of Endo Products Inc., Richmond Hill, N. Y.

Aqueous histamine therapy, beginning with 0.15 cc. and increasing to 1.0 cc., three times weekly, was instituted and continued for three months. At the end of this time, he volunteered that he was able to sit in a chair without discomfort for several hours at a time and had attended a motion picture for the first time in five years. The use of repository histamine (0.5 cc.) enabled us to lengthen the interval between injections. At present the patient is comfortable on only one injection of aqueous histamine every two or three weeks.

Mr. J. D. J., a 28-year-old white male, had a history of sudden onset of pain in both hips four months before we saw him. His pain had become progressively worse in the two months previous to his visit to our office, and he had become bed-ridden. Only very limited walking was possible, because walking was accompanied by severe pain, and was accomplished only by a rotation and forward swinging movement of one side of the body at a time. He had been treated with cortisone, deep x-ray, and butazolidin. X-ray examination showed definite narrowing of the hip-joint spaces on both sides. Several extracapsular areas of calcification, and irregular areas of pseudocystic appearance were noted. A differential diagnosis of 1) infectious rheumatoid arthritis and 2) aseptic necrosis was considered. The red cell sedimentation rate was 28 mm. per hour. The eosinophil count per cu. mm. was 250 before treatment and 250 after treatment.

The patient was started on intradermal injections of aqueous histamine (0.15 cc.) and intramuscular injections of repository histamine (0.1 cc.). He was treated daily for four weeks. The aqueous solution was increased by 0.05 cc. daily until a total daily dose of 1.85 cc. of the aqueous material was being given; the repository histamine was increased until a daily dose of 0.8 cc. was being given. At the beginning of the third week (after twelve treatments) the patient volunteered that he began to feel better and that his pain was less. The next day he walked one and a half blocks for the first time in two months. Then improvement was gradual each day. By the beginning of the fourth week he was swinging his legs and walking without a cane. At this point he was taught the technic of intramuscular injection and was instructed to self-administer 0.5 cc. of Histapon daily. He carried out this plan, permitting a reduction in the frequency of aqueous histamine injections to three times weekly. It was not until 1.75 cc. of aqueous histamine was given that it was possible to demonstrate any change in the eosinophil count.

DISCUSSION

Histamine may be administered by any of the following methods: subcutaneous, intracutaneous, intravenous, intra-arterial, deep intramuscular, or iontophoresis. There have been numerous reports on the use of histamine by iontophoresis. Deutsch (10) reported it to be effective in soft-tissue involvements such as bursitis and fibrositis. Kling (11, 12) reported excellent results with its use in arthritis. Hummon (13) has recently reported on his wide experience at Cook County Hospital, Chicago, where he obtained favorable results with iontophoretic histamine treatments given during a five-year period to over 1,000 patients suffering from a variety of disorders including arthritis, acute traumatic conditions (such as bursitis), fibrositis, and post-traumatic conditions following fracture or dislocation.

In considering this approach to the treatment of rheumatic disorders with histamine, there are several phenomena which are of greatest importance:

A. Histamine exerts a profound local effect when injected intracutaneously over a hot, painful joint. This effect is more than a superficial capillary dilatation. In this series we repeatedly observed a rapid diminution of redness, heat, pain and swelling—often after the first two or three injections.

B. There is dramatic local relief of pain, beginning with the first injection and lasting eight to twelve hours or longer.

C. There is a general effect, not only on other painful joints, but systemically as well. This occurs either as a result of the local effect, or as a separate generalized reaction.

D. This general and systemic effect is of short duration at first; with succeeding treatments it is gradually of longer duration until it becomes permanent.

Recently there has been made available to us a repository type of histamine in the form of a histamine diphosphate suspension in a menstruum of oxycholesterol derivatives dissolved in peanut oil (Histapon).[1] This preparation, employed in the latest 10 patients of our histamine-treated series, was used as a supplement to the intracutaneous injections as a means of prolonging the therapeutic effect and lengthening the interval between treatments. It is too early to express a definite opinion, but it is our distinct impression at this time that with Histapon there is a definite summation effect. We have used the dosage recommended by Jonez (6), beginning with 0.05 cc. of the suspension and increasing by 0.05 cc. daily to 0.5 cc. maximum. In our hands, this dosage has resulted in satisfactory alleviation of pain in the joints and contiguous structures, without the production of side effects. With this schedule, it has not been necessary to resort to the use of epinephrine.

Repository histamine alone was used in 3 elderly and physically deteriorated patients. There was great doubt that they could tolerate the impact of the strong histamine reaction induced by the aqueous preparation. In none of these patients have the results been as dramatic as with aqueous histamine. However, gradual improvement was noted in all.

There has been a recent follow-up study on the first 42 patients in this series, all of whom had had no treatment in the nine months previous to the inquiry. Written replies were received from 39 of the 42. All of these had maintained their improvement, were gratified with the results, and would want the same treatment again if the condition recurred.

In all of our patients vitamin supplements were encouraged. In any patients who had anemia, immediate steps were taken to correct this situation. Salicylates were used only rarely, and little use was made of heat or diathermy. Occasionally there was judicious use of physiotherapy after the acute phase of the process had subsided, and when it appeared that the range of motion in a joint could be increased as a result of such treatment.

SUMMARY

Sixty-five patients, manifesting various features of rheumatic disease (bursitis, fibrositis, arthritis), were treated with injections of aqueous histamine diphosphate. In the last 10 patients (chronologically) repository histamine (Histapon) was employed to supplement the action of the aqueous preparation. The repository preparation kept these patients symptom-free for longer periods of time, obviated the necessity for frequent injections of aqueous histamine, and permitted lengthening of the interval between injections.

Most of the patients had experienced painful rheumatic disorders for long periods of time and had received the usual treatment (x-ray, gold, salicylates,

phenylbutazone, cortisone, and ACTH). These previous treatments had been failures. Such patients required longer treatment with histamine. Other patients in this series with rheumatic disorders of more recent origin made more dramatic recoveries and required treatment for shorter periods of time.

The marked improvement bears a striking resemblance, in terms of symptom-response, to that which may be achieved with cortisone and/or ACTH, with this important difference: side effects which are common during administration of these hormones do not occur with the histamine preparations.

Similarly, eosinopenia resulting from histamine treatment resembles that achieved with cortisone or ACTH. This profound decrease in circulating eosinophils occurs much more rapidly and more definitely with histamine. The improvement in the course of the disease and the satisfactory response to histamine are closely paralleled by the fall in eosinophil levels.

There were 4 therapeutic failures in this series of 65 patients—all of them in patients with atrophic arthritis. In all 4 there was no effect on the eosinophil count.

In a recent paper, Stefanic and Loyke (16) postulate that "mobilized free histamine in the circulating blood presumably provokes (through vasodilatation or direct stimulation) an added release of epinephrine which then stimulates the pituitary through the hypothalamus, to activate the adrenal cortex." Some of our favorable results in patients who had not previously responded to cortisone therapy might be explained on this basis.

CONCLUSION

Intracutaneous injection of histamine is a valuable therapeutic procedure in many types of rheumatic disease. Histamine is the agent of choice in the treatment of rheumatic disorders, especially those marked by soft-tissue involvement and some types of bone involvement. Repository forms of histamine may prove to be even more valuable as aids in treatment, because of the sustained therapeutic effect and prolongation of action.

Addendum

This series of 65 patients has now been increased to over 150. The results of treatment in the larger series are essentially the same as reported here. More recently we have begun histamine therapy with Histapon alone. The use of this repository histamine offers a new approach to the treatment of rheumatic disorders, and our results will be reported in due time.

REFERENCES

1. WINDAUS, A., AND VOGT, W.: Synthesis of iminazolylethylamine, *Ber. d. deutsch. chem. Gesellsch.* **40:** 3691, 1907.
2. BARGER, G., AND DALE, H. H.: The presence in ergot and physiological activity of β-iminazolylethylamine, *J. Physiol.* **40:** 38, 1910.
3. BEST, C. H.; DALE, H. H.; DUDLEY, H. W., AND THORPE, W. F.: The nature of the vasodilator constituents of certain tissue extracts, *J. Physiol.* **62:** 397, 1927.
4. SELLE, W. A.: Histamine—Its physiological, pharmacological and clinical significance, *Texas Rep. Biol. & Med.* **4:** 138, 1946.

5. Horton, Bayard T.: The clinical use of histamine, *Postgrad. Med.* **9:** 1, 1951.
6. Jonez, H. D.: Repository histamine therapy in allergy, *Quart. Rev. Allergy & Appl. Immunol.* **6:** 283–289, 1952.
7. Ewiatkowske, H.: Histamine in nervous tissue, *J. Physiol.* **102:** 32, 1943.
8. Jonez, H. D.: Certain vascular effects of histamine and *d*-tubocurarine in multiple sclerosis, *Ann. Allergy* **8:** 188, 1950.
9. Roth, G. M., and Kvale, W. F.: A tentative test for pheochromocytoma, *Am. J. M. Sc.* **210:** 653, 1945.
10. Stefanic, Edward J., and Loyke, Hubert F.: Effects of histamine on the Marchiafava-Micheli syndrome, *Ohio State M. J.* **47:** 424, 1951.
11. Randolph, T. G.: Differentiation and enumeration of eosinophils in the counting chamber with a glycol stain: a valuable technique in appraising ACTH dosage, *J. Lab. & Clin. Med.* **34:** 1696, 1949.
12. Deutsch, D.: Histamin zur Therapie rheumatischer Erkrankugen, *Med. Klin.* **27:** 1491, 1931.
13. Kling, D. N.: Histamine therapy of rheumatic affections and disturbances of peripheral circulation, *Ann. Surg.* **99:** 568, 1934.
14. Kling, D. N.: Treatment of myositis, arthritis and disturbances of the peripheral circulation with histamine by cataphoresis, *Arch. Surg.* **29:** 138, 1934.
15. Hummon, I. F.: Histamine ion transfer—A five-year evaluation, *Arch. Phys. Therapy* **25:** 212, 1944.
16. Stefanić, Edward J., and Loyke, Hubert F.: Further studies on the effect of histamine on the Marchiafava-Micheli syndrome, *Ann. Allergy* **10:** 40, 1952.

PROSTATIC OBSTRUCTION IN THE AGED*

ROBERT S. HOTCHKISS, M.D.†

New York University–Bellevue Medical Center, New York, N. Y.

A consideration of the problem of senility is inextricably associated with prostatism, for over 80 per cent of men attaining the age of 80 years have prostatic hypertrophy. The incidence of carcinoma of the prostate increases markedly with age, although it is far less aggressive than in younger men. Cancer cells have been found in the prostate in 42 per cent of men between 80 and 84 years old, in 71 per cent between 85 and 89, and in 80 per cent of men between 90 and 99 (1). Relief from the symptoms caused by one of these obstructing lesions may require surgery. The invariable, and usually multiple, disorders in other systems impose problems that deserve the attention of those especially interested in senescence.

The modern era of prostatic surgery began in 1890 when Belfield gathered together 133 case records of patients upon whom operations had been performed by surgeons of that period (2). Various surgical techniques have been employed since that time to remove prostatic obstructions (Figs. 1–9). Five methods for dealing with benign prostatic hypertrophy are in current use: one-stage suprapubic prostatectomy, two-stage suprapubic prostatectomy, retropubic prostatectomy, perineal prostatectomy and transurethral resection of the prostate (Figs. 5–9). All are designed to remove only the hypertrophied glandular tissue, and therefore should be more properly designated as prostatic adenomectomy rather than prostatectomy, for the latter implies the removal of the entire gland. Total prostatectomy for early cancer is not usually considered for men over 70 years of age and hence is eliminated from this discussion. Cancer of the prostate in the advanced age group is almost universally treated by hormonal therapy, supplemented when necessary by transurethral resection. The purpose of this presentation is to ascertain if survival from prostatectomy has been improved during the past sixty-five years and, if true, to attempt to identify the reasons for such an achievement. This may permit an evaluation of present methods and allow speculation regarding the management in the future.

MORTALITY FROM PROSTATECTOMY

There are circumstances relative to statistics concerned with prostatic operations, which prevent the complete interchangeability of data advanced by various authors. It has been demonstrated that charity and ward patients have a mortality rate three times that of private patients (3). McCrea attributed this largely to the poor physical status of the ward patient as compared to that of the

* Presented at the Graduate Symposium on Geriatric Medicine, given by the American Geriatrics Society, New York, N. Y., November 12–13, 1954.

† Professor and Chairman, Department of Urology, New York University–Bellevue Medical Center, 550 First Avenue, N. Y.

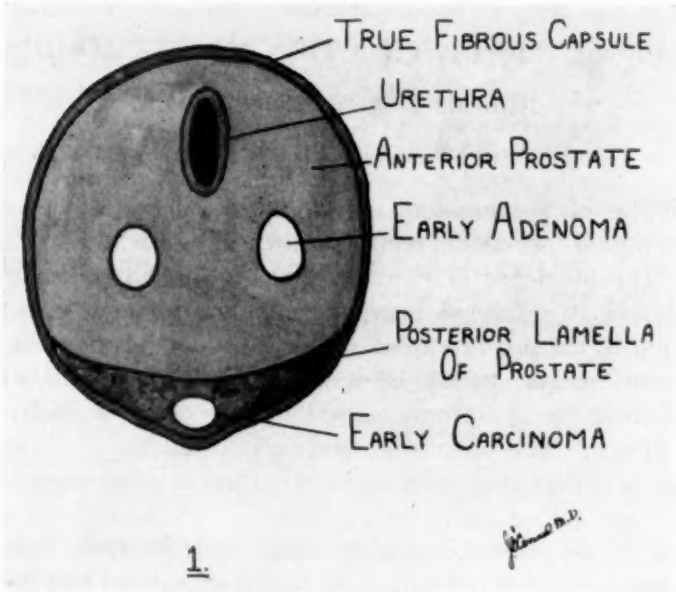


FIG. 1. Transverse section through prostate demonstrating early benign prostatic hypertrophy and early carcinoma.

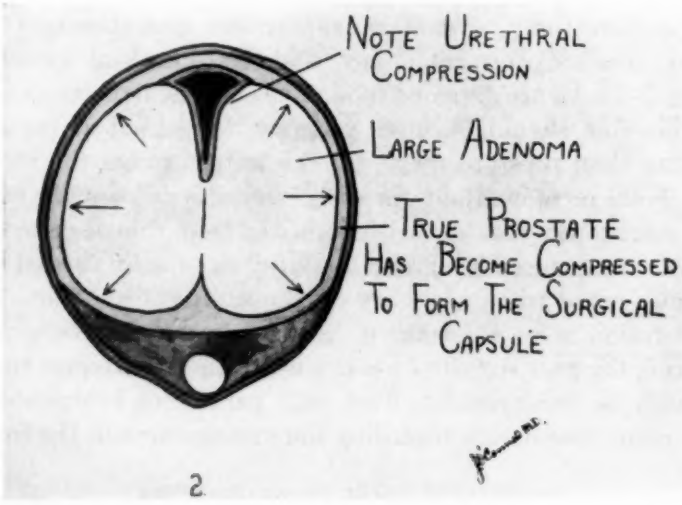


FIG. 2. Transverse section through prostate demonstrating compression by adenomatous hyperplasia.

private patient. The experience of the surgeon also has a specific bearing on the chance of survival, for it is freely acknowledged that repetitive performance of transurethral prostatectomy is necessary to acquire even a modest proficiency. Mercier analyzed his own operative record on 900 transurethral prostatectomies (4). The mortality rate for the first 25 cases was 32 per cent. As aptitude and experience were acquired, in the last 150 of 300 operations the rate fell to 5.3 per cent. The final 400 operations were completed with a mortality rate of only 0.7

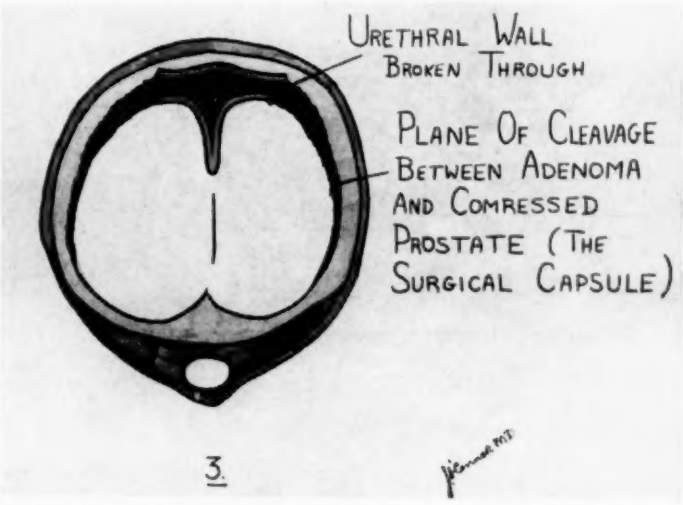


FIG. 3. Transverse section through prostate demonstrating lines of cleavage in enucleation of adenomatous lobes.

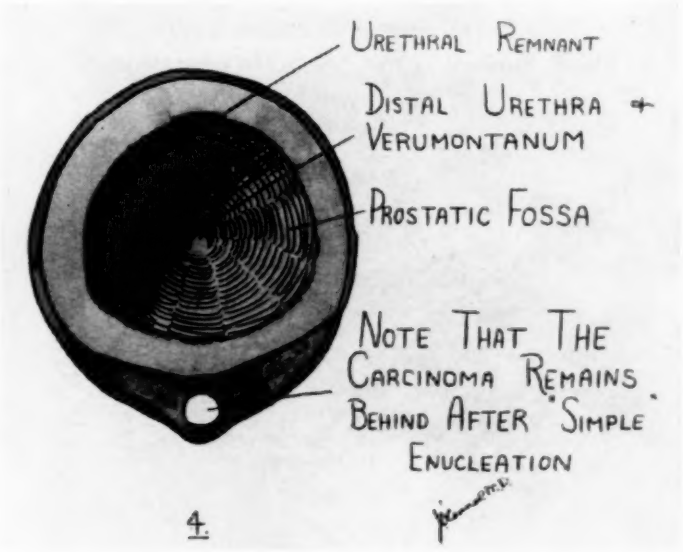


FIG. 4. Transverse section through prostate demonstrating prostatic fossa and urethral remnant following enucleation.

per cent. Therefore, it is manifestly ill advised to utilize data from a charity service engaged in a residency training program for comparison with the results of a skilled surgeon performing prostatic resections upon private patients. Furthermore, the composition of groups of patients is influenced to some extent by geography, thus foreordaining the mortality rate to a significant degree. Patients who are extreme surgical risks are often unable to survive a trip to a distant clinic or hospital and are transported by ambulance to the nearest city hospital. Accordingly, the regional hospitals acquire more patients who

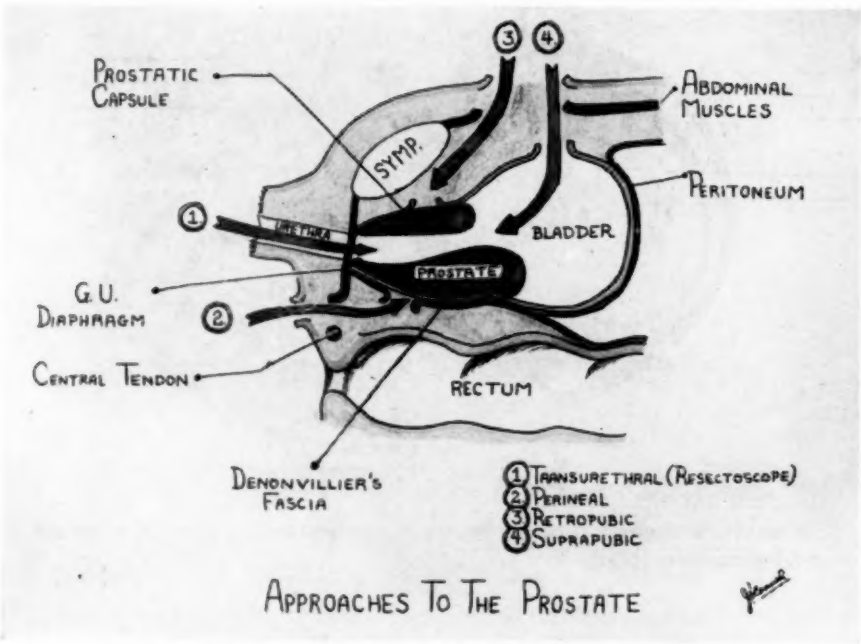


FIG. 5. Surgical approaches to the prostate gland

FIG. 6. Suprapubic prostatectomy

are less likely to survive than do the more isolated institutions. These and other variables must be borne in mind in the following discussion, for there is considerable variation in the data, according to source.

The mortality in the 193 prostatectomies summarized by Belfield in 1890 was only 18 per cent. The death rate from prostatectomies at the Massachusetts

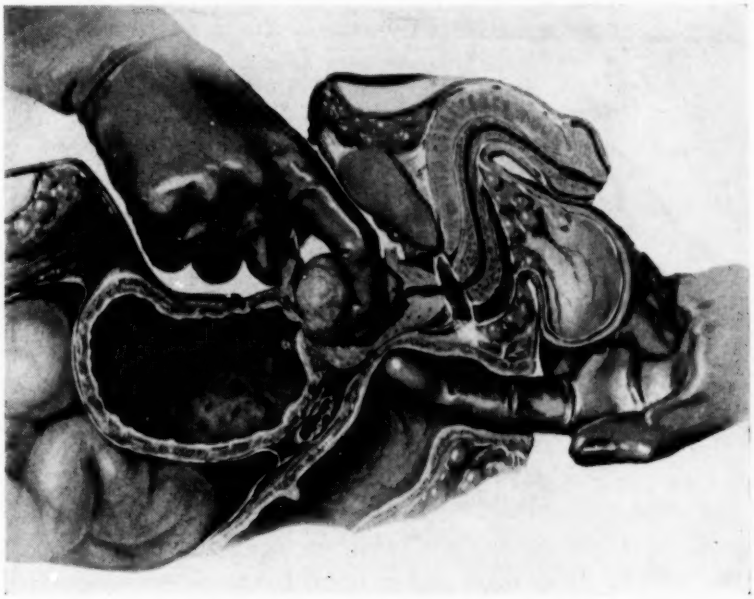


FIG. 7. Retropubic prostatectomy

FIG. 8. Perineal prostatectomy

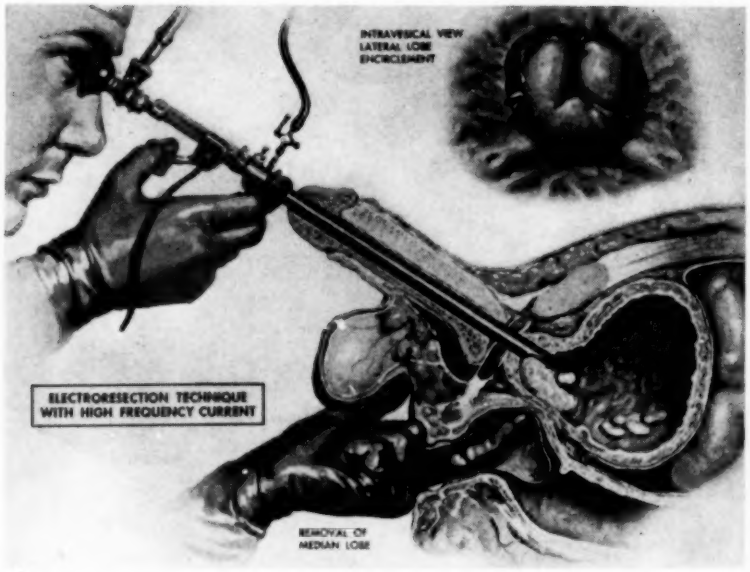


FIG. 9. Transurethral prostatectomy

General Hospital had fallen to 5.8 per cent by 1930, from a previous average of 18.8 per cent (5).

Draper reviewed 2,021 prostatectomies performed at Bellevue hospital from 1920 to 1946 and found that an initial mortality of 42.8 per cent had declined to 4.6 per cent during the twenty-seven years (6). There is an abundance of material which demonstrates, in a like manner, that the chance of survival from prostatectomy has improved enormously since 1900. The prevailing mortality rate in this country now ranges from 0.5 per cent to 5.0 per cent, subject to circumstances, of which only a few have been cited.

An important point is the risk of surgery in the very aged. It would appear from the report of Swan and Mintz in 1926 that surgical operations performed upon men over the age of 80 were considered by some as prohibitive, for among 250 patients only 1 was over 80 years of age (5). However, Young had the courage to perform open operations upon 31 men aged 80 years or over, and in 1926 related that 16 per cent of them died (7). In 1906 Tenney obtained the records of 24 men aged 79 and above who submitted to prostatectomy; the death rate was 35 per cent (8). In 1936 Twinem reviewed prostatectomies performed at the New York Hospital on 40 men over the age of 80; the mortality was 33 per cent (9). Latchem and Emmett of the Mayo Clinic assembled the data on 345 men above the age of 80 who were relieved of prostatic obstruction by the transurethral method, during the years 1934 to 1942. Only 2.6 per cent failed to survive (10). This excellent record stands as evidence for the policy adopted by present-day urologists, who hold that age itself is no longer a contraindication to necessary surgery upon the prostate. Almost every group of patients presented for analysis in the past twenty-six years includes a generous number of octogenarians who have been afforded relief by surgery, with a mortality rate somewhat higher than

that in younger men but still within the range of acceptable risk. Thus, the reduction in the risk of prostatic surgery has become an accepted fact. Let us now examine the possible reasons for such attainment.

PROSTATECTOMY

Choice of operative technique

The past half century has seen many violent and stormy debates relative to the merits and disadvantages of the several surgical methods of relieving prostatic obstructions. There are surgeons today who employ one operative technique for all cases, but most urologists select one of the previously mentioned open surgical methods for large glands and employ the closed transurethral resection for smaller adenomas, fibrous bars, and carcinoma. Not infrequently the devoted advocates of one particular method credit a low mortality rate to the type of surgical operation they employ. A recent report by MacDonald of the Montreal General Hospital affords information that lends credibility to the assumption that the choice of operative technique has little influence in the outcome of the surgery, if the conditions are standardized and comparable (11). In that institution, 530 patients were operated upon in the years 1937 to 1944, with a death rate of 7.6 per cent. A similar number had prostatic operations in the antibiotic years of 1947 to 1952, with a mortality rate of 2.0 per cent. The mortality rate from open operation was 2.5 per cent, and from transurethral resection, 2.2 per cent.

A survey of the urologic literature of recent years leaves one with the distinct impression that under good conditions the mortality rate from transurethral resection ranges from 0.6 per cent to about 3.0 per cent, whereas from open operation alone it ranges from 0.6 per cent to as high as 5.0 per cent. However, the hazard of surgery increases with the large obstructions and often the very ill patients are treated by two-stage prostatectomy, so that open surgery may be burdened with greater risks. It is apparent from the foregoing, that the factor of operative technique alone does not account for the impressive reduction in mortality. There has been no radical development in procedures, with the exception of transurethral prostatectomy, and the percentile advantage of any one procedure is minimal as compared to the total reduction in operative deaths. It is necessary, therefore, to examine other factors concerned with prostatic surgery to explain the decrease in mortality.

Time of operation

Fifty years ago the risk of surgery was so great that most elderly men with prostatic disorders would permit operation only after having exhausted the resources of catheterization and endured the consequences of urinary sepsis. The fear of surgery was reduced by the increase in chance of survival and gradually increasing numbers of patients consented to operation before the complications of the disease depleted their power of recovery. It is likely that the appeal of transurethral resection has been very effective in this regard, for the anxiety about surgery is modulated by the knowledge that no external

incision is required. There is little doubt that the average patient now submitting to prostatic surgery is a far better risk than those who sought aid from our urologist forefathers. Early operation is, no doubt, an important factor in the present low mortality rate.

Preparation for surgery

Advances in physiology have equipped the surgeon with formidable means to supervise the management of the patient. The elderly patient has far less capacity to adjust to stress than has the younger one, and his mechanism for saturating the blood with oxygen is less efficient. Water balance and electrolyte equilibrium are restored before, as well as after, surgery. Base is supplied to correct acidosis, dehydration is treated by oral or parenteral fluids, and mineral deficiencies are managed by substitution therapy. Kidney function, which may have been impaired by the accumulation of urine in the bladder, is often improved by urethral or cystotomy drainage, thereby clearing retained metabolites in the fluids and tissues (12).

That these preoperative precautions are of importance is borne out by the experience of two British Clinics. Two-hundred and nineteen patients with urinary retention were subjected to immediate suprapubic prostatectomy in one clinic, with a resultant mortality rate of 7.3 per cent (13). In the same year another British clinic reported a mortality rate of 1.97 per cent for suprapubic prostatectomy, utilizing a strict policy of preoperative preparation as previously outlined (4).

Blood loss and replacement

Shock is a serious event for the elderly man. This catastrophe is to be avoided, despite the fact that, should it occur, blood is available for transfusion. The amount of blood lost is usually proportionate to the size of the gland. According to Goodyear and Beard, an average of 260 cubic centimeters of blood is to be expected from glands weighing 40 grams or less during removal by transurethral resection. Glands of larger size treated by open operation entail losses of two to three times that amount (15). Goldstein and Rubin likewise measured blood loss and found the smallest loss occurred with two-stage suprapubic prostatectomy, averaging approximately 200 cubic centimeters (16). Surgical plans are guided by these facts, particularly if coronary circulation is already compromised. One may appreciate the former high mortality rates when it is to be recalled that a transfusion was a special event reserved for the exsanguinated patient.

Control of infection and other factors

Death resulting from unbridled infection in the susceptible tissues of the senile patient was a formidable risk thirty years ago. Testimony to the effectiveness of sulfonamides and antibiotics in the reduction of mortality is afforded by the sharp drop in the annual death rates from prostatectomy after their introduction. Bacteria can still be cultured from the urine of every urologic patient recovering from operation, but the attenuated organisms are held in clinical abeyance.

Modern anesthesia, early ambulation, a well trained house staff, and dietary management are complementary influences that augment the chances for survival as compared to the early 1900's.

Prostatectomy in the future

The modern urologist may select the appropriate type of operation, prepare the patient for surgery, prevent and combat shock, prescribe antibiotics and substitution therapy and organize hospital facilities for the benefit of the patient, but there remain two hazards that are still largely beyond control. There is a natural attrition rate for any elderly population in or out of hospitals. Sudden demise from the degenerative diseases of old age is charged to surgical mortality, if the death occurs in the hospital following an operation. Occasionally there is sudden death of an elderly patient awaiting surgery. Pulmonary emboli increase with age and Fowler and Bollinger have shown that 80 per cent of fatal emboli occur after the age of 40 (17). Furthermore, these are particularly common in genito-urinary cases, especially in patients who have cardiovascular disease. Two thirds of such emboli arise within the veins of the pelvis or in the heart, so that the precaution of ligation of the veins of the lower extremities could not possibly afford complete protection against one of the most common direct causes of death in the aged.

CONCLUSION

The first fifty years of this century have witnessed a gratifying reduction in the risk of prostatic surgery.

This achievement has been accomplished by application of principles largely devised in the laboratories of the basic sciences. The theories of management are predicated upon renal physiology, electrolyte and water balance, replacement of blood loss, and the control of bacterial infection. Operative techniques have been improved but their influence is of minor importance. It is unlikely that any large group of patients will undergo prostatectomy without postoperative deaths. Presently, the greatest threats are cardiovascular complications and pulmonary emboli. Old age, by itself, is no contraindication to necessary surgery. Early operation is greatly to be desired over that performed after unwise delay and procrastination. Each type of prostatectomy carries a mortality rate, so that unnecessary surgery is to be equally deplored. The decision as to the time of operation is made only after considered study of each patient, and is the product of the acquired experience and the judgment of the urologist.

Acknowledgment

Figures 1 to 5 were drawn by Dr. John J. O'Connor, Senior Resident Urologist, Department of Urology, Fourth Division, Bellevue Hospital, New York City.

Figures 6 to 9 were reproduced from illustrations by Dr. F. Netter from "The Prostate" by Dr. Samuel A. Vest, Ciba Clinical Symposia, Vol. 6 March–April 1954. Permission kindly granted by Dr. J. Harold Walton, Editor.

REFERENCES

1. Hirst, A. D., and Bergmann, R. T.: Carcinoma of the prostate in men 80 or more years old, *Cancer* **7:** 136–141, 1954.
2. Belfield, W. T.: Operations on the enlarged prostate with tabulated summary of cases, *Am. J. M. Sc.* **100:** 439–452, November, 1890.
3. McCrea, L. E.: The end results of prostatectomy, *J. Urol.* **53:** 466–467, 1945.
4. Mercier, O.: End results of 900 cases of transurethral resection of the prostate, *J. Urol.* **49:** 665–668, 1943.
5. Swan, C. S., and Mintz, E. R.: A review of prostatectomy for benign hypertrophy at the Massachusetts General Hospital, *J. Urol.* **26:** 67–90, 1931.
6. Draper, J. W.: Twenty-seven years of prostatic surgery at Bellevue Hospital, *Surgery* **23:** 515–521, 1948.
7. Young, H. H., and Davis, D. M.: *in* Young's Practice of Urology. Philadelphia, Pa., W. B. Saunders & Co., 1926, vol. 1, pp. 490–491.
8. Tenney, B.: Time for prostatectomy, *Tr. Am. Urol. A.* **6:** 119–124, 1912.
9. Twinem, F. P.: The very aged prostatic, *J. Urol.* **35:** 349–352, 1936.
10. Latchem, C. W., and Emmett, J. L.: Transurethral resection for men 80 or more years of age, *J. Urol.* **53:** 482–485, 1945.
11. MacDonald, S. A.: Prostatectomy; mortality and morbidity, *J. Urol.* **72:** 439–442, 1954.
12. Lapides, J.: Physiopathology and therapy of fluid disorders in prostatism, *Geriatrics* **9:** 20–27, 1954.
13. Silverstone, M.: Immediate prostatectomy, *Brit. J. Surg.* **41:** 418–424, 1954.
14. Parsons, F. M.: Chemical imbalance occurring in chronic prostatic obstructions, *Brit. J. Urol.* **26:** 7–21, 1954.
15. Goodyear, W. E., and Beard, D. E.: Blood loss in prostatectomy, *J. Urol.* **62:** 849–857, 1949.
16. Goldstein, A. E., and Rubin, S. W.: Blood loss in open prostatic surgery, *J. Urol.* **60:** 743–748, 1948.
17. Fowler, E. F., and Bollinger, J. A.: Pulmonary embolism, *Surgery* **36:** 650–663, 1954.

JAUNDICE IN THE AGED: DIAGNOSTIC AND THERAPEUTIC IMPLICATIONS*

FREDERICK STEIGMANN, M.D., VASILIOS GODELLAS, M.D. AND SHIBLI M. CANAHUATI, M.D.

The Hektoen Institute for Medical Research and the Departments of Internal Medicine and Therapeutics of the Cook County Hospital, and the Department of Internal Medicine, University of Illinois College of Medicine, Chicago, Illinois

Obstructive jaundice whether complete, as caused by a malignant lesion in the extrabiliary tract or head of the pancreas, or incomplete, as caused by a benign process in these areas, is usually a condition met in the older age groups. This holds true especially for obstructive jaundice due to malignant neoplasms. It is thus only natural that there has developed a tendency to look upon jaundice in the aged person as secondary to some obstruction which interferes with the flow of bile through the common bile duct or the larger extrahepatic biliary passages. Jaundice in an elderly individual, therefore, is usually thought to be indicative of an obstructive lesion such as a malignant growth in the head of the pancreas or extrahepatic biliary tract. At times, especially in the presence of colicky pain, the possibility of gall stones may be considered; and in the presence of sepsis, an inflammatory disorder of the extrahepatic biliary passages. Icterus due to intrahepatic disease is usually the last diagnosis to be considered when the patient is in the older age group.

The incidence of obstructive jaundice among several series of icteric patients may vary considerably, depending on the geographic area and upon the type of practice in the particular clinic from which the report emanates. Thus at the Mayo Clinic, to which many surgical patients are attracted, the incidence of obstructive jaundice at one time was about 66 per cent, a frequency also found later by Weir (1), who reported an incidence of this type of icterus in half to two thirds of his cases. At the Boston City Hospital the incidence of obstructive jaundice was reported as only about 25 per cent (2). In our material at the Cook County Hospital, jaundice of mechanical origin was observed in about 28 per cent of the total icteric patients and in about 50 per cent of the patients in whom the cause was definitely established.

Most reports as to the incidence of the various types of jaundice deal essentially with patients in all age groups. We have found no definite data as to the incidence according to specific age groups. There is a suggestion of an increase in the benign obstructive type of jaundice in the higher age groups in Collins' study (3), in which he showed the marked rise of gallbladder disease after the fourth decade. In a previous study of jaundiced cases of all ages by one of us (F. S.), it was found that 77 per cent of the patients with malignant obstruction, 46 per cent of those with benign obstruction, 33 per cent of those with cirrhosis and 24 per cent of those with hepatitis were above 50 years of age. On the other hand,

* Presented at the Annual Meeting of the American Geriatrics Society, New York, N. Y., April 21–22, 1955.

5 per cent, 29 per cent, 17 per cent and 51 per cent of the respective groups were below 40 years of age.

CLINICAL MATERIAL

In this paper an attempt is made to re-evaluate the concept that icterus in an elderly person is usually on a mechanical basis, and to make a comparison of some of the clinical and laboratory data in these older patients suffering from different types of jaundice. Moreover, the clinical and laboratory data in the total number of jaundiced patients of all age groups will be discussed in relation to the data in the higher age groups, in order to see whether there are any variations in signs and symptoms which serve as criteria in the differential diagnosis of the types of jaundice.

Our material consists of 1,165 jaundiced patients. In 543 of these the diagnosis was proved either by the findings at operation, liver biopsy, necropsy, or both. Of the 543 patients, 116 were over 60 years of age (Table 1). Most of the patients were between 60 and 69 years old, although a few were 70 and over; 73 were male and 43 were female; 93 were white and 23 Negro (Table 2). All these patients had one or more series of liver function tests and were observed for variable lengths of time in the hospital. For comparison, only the initial liver

TABLE 1

Incidence of the Different Types of Jaundice

Type of Jaundice	Total No. of Cases	Total No. in Patients 60 Yrs. of Age and Over	Per cent of Total Patients Over 60	Total No. of Cases with Proven Diagnosis*	Per cent Which Proven Cases Constitute of Total No.	No. of Proven Cases in Patients 60 yrs. of Age and Over	Per cent of Proven Cases in Patients 60 yrs. of Age and Over
Malignant obstruction	191	73	38	163	85	52	32
Benign obstruction	143	45	31	114	80	34	30
Cirrhosis	359	30	8	122	34	22	18
Hepatitis	472	28	6	144	30	8	6

* Proven by operation, biopsy or necropsy.

TABLE 2

Percentage of Patients With Each Type of Jaundice According to Age, Sex and Race, in the Groups 60 Years of Age and Over

Type of Jaundice	Age			Sex		Race	
	60–69	70–79	80+	Fem.	Male	White	Negro
Malignant obstruction	54	46	0	33	67	80	20
Benign obstruction	68	21	12	45	55	80	20
Cirrhosis	86	14	0	32	68	100	0
Hepatitis	90	10	0	25	75	62	38

series of function tests was used. All the patients with obstructive jaundice underwent operation.

RESULTS

A comparison of the data obtained on jaundiced patients in the 60-and-over age group reveals definite differences between the medical (cirrhosis and hepatitis) and surgical (benign and malignant obstruction) types. Even in this comparatively small group of 116 cases, obstructive jaundice predominated at the higher ages, both in the total number of cases and in the cases subdivided by decades (Table 2). It is also of interest that males predominated in all categories, even in the benign obstructive type, despite the usually higher incidence of gallbladder disease in the female. This observation confirms a previous report of one of us in which this paradoxical larger number of males was also noted (4). The absence of any elderly, colored cirrhotic patient in over 100 cases of cirrhosis in a hospital with a Negro population of about 50 per cent is also noteworthy.

Fever and chills were more commonly present in patients with cirrhosis and obstructive types of jaundice, whereas patients with acute hepatitis had no such complaints. Moderate weight loss was more often noted in the medical type of jaundice, in contrast to the marked weight loss of over 20 pounds usually found in the surgical type (Table 3).

Uncharacterized, poorly localized, generalized abdominal pain was more of a feature in the medical type of jaundice. Thus in 63 per cent of the malignant and 56 per cent of the benign cases, respectively, there was definite localization of the pain, as compared to 28 per cent in the hepatitis and 17 per cent in the cirrhotic cases. Nausea was of equal incidence among all the types of jaundice, whereas vomiting was predominant in the surgical groups. Melena was found chiefly in the cirrhotic cases, but diarrhea was present with equal frequency in patients with obstructive jaundice and in those with cirrhosis. The incidence of light-colored stool was lowest in the cirrhotic cases (Table 4).

The patients with hepatitis had only a slight fever, and a temperature of over 101° F. was found only in a few patients of the benign obstructive group. A markedly elevated pulse was present in a small percentage of patients in both the benign obstructive and hepatitis groups. Hypertension with a sytolic blood pressure of 150–200 was found in only a small percentage of all groups. Some abnormality in the heart findings was noted in almost all patients with cirrhosis

TABLE 3

Percentage of Cases Showing Miscellaneous Symptoms

Type of Jaundice	Fever	Chills	Wt. Loss (lbs.)		
			less than 10	10–20	more than 20
Malignant obstruction	16	8	20	20	52
Benign obstruction	18	15	12	44	44
Cirrhosis	25	25	12	53	6
Hepatitis	0	0	0	83	0

TABLE 4

Percentage Incidence of Significant Gastrointestinal Symptoms

Type of Jaundice	Nausea	Vomiting	Diarrhea	Melena	Dark Urine	Light Stool	Pain			
							RUQ	Epig.	Upper Abd.	Generalized
Malignant obstruction	71	50	50	12	97	97	33	19	11	25
Benign obstruction	47	56	6	3	68	79	21	35	0	21
Cirrhosis	75	33	50	31	64	56	6	11	0	53
Hepatitis	33	0	25	0	100	100	0	28	0	14

TABLE 5

Percentage Incidence of Significant Nonspecific Findings on Examination

Type of Jaundice	Temperature		Pulse		Systolic Blood Pressure		Abnormal Heart Findings	Abnormal Lung Findings
	98.6°–101°	over 101°	88–104	over 104	100–150	152–200		
Malignant obstruction	57	3	33	0	77	23	37	39
Benign obstruction	47	11	45	15	90	10	21	6
Cirrhosis	62	8	81	6	81	19	100	45
Hepatitis	100	0	0	13	86	14	43	0

and in approximately half of those with hepatitis. There were abnormal pulmonary findings in 45 per cent of the patients with cirrhosis and in 39 per cent of those with malignant obstruction (Table 5).

Severe icterus was seen mostly in the patients with hepatitis and malignant obstruction. Tenderness over the liver region on pressure was noted chiefly in the surgical types. Huge livers were found in a small percentage of patients with all types of jaundice, but mostly in those with malignant obstruction. Ascites was noted in the cirrhotics and in a few patients with malignant obstruction. The incidence of edema was similar to that of ascites. As one would expect, distention of the abdominal veins and spider nevi were seen only in many of the cirrhotics. Dermatitis factitia was noted in about half of the cases with malignant obstruction (Table 6).

Severe anemia with a red blood cell count of less than 2.5 million was found only in cases of jaundice from malignant obstruction. A low concentration of hemoglobin (less than 50 per cent) was present in a few of the patients with jaundice of the surgical type and in those with cirrhosis. A white blood cell count of less than 6,000 was found chiefly in patients with hepatitis; a count over 10,000 was found in almost equal proportions in the groups with surgical jaundice and with cirrhosis. A polymorphonuclear count of less than 70 per cent occurred mostly in the cases of hepatitis. Macrocytosis and targeting was found in 50 per cent of patients with hepatitis and in a smaller percentage of those with other types of jaundice. Many hepatitis patients had over 10 per cent of monocytes (Table 7).

TABLE 6

Percentage Incidence of Significant Specific Findings on Examination

Type of Jaundice	Degree of Icterus		Liver					Palp. Spleen	Ascites	Distention of Veins	Edema	Spider Nevi	Derm. Factitia
	Mod.	Severe	Tender to pressure	Size in cm. 1–2	3–4	5+	Nodular						
Malignant obstruction	22	98	55	23	58	18	63	36*	36	0	50	0	50
Benign obstruction	48	52	24	45	30	25	3	6	9	6	3	0	6
Cirrhosis	100	0	14	25	30	10†	0	7†	61	87	92	88	0
Hepatitis	0	100	0	25	38	38	0	0†	0	0	0	0	0

* Enlarged spleens due to high incidence of biliary cirrhosis in this group.

† Spleens and livers could not be felt in some patients because of ascites.

TABLE 7

Percentage Incidence of Changes in Blood Morphology

Type of Jaundice	Red Blood Cell Count (millions/cu. mm.)			Hemoglobin (%)		White Blood Cell Count (thousands/cu. mm.)		Polymorphs		Lymphocytes		Monocytes			Macrocytosis	Targeting
	less than 2.5	2.5–3.5	3.6–5.0	less than 50	75–100	less than 6,000	over 10,000	50–70%	over 70%	less than 25%	26–35%	less than 5%	6–10 %	over 10%		
Malignant obstruction	23	42	35	7	32	6	34	14	86	92	8	36	56	8	33	33
Benign obstruction	0	24	76	4	44	18	41	11	89	89	11	65	35	0	15	15
Cirrhosis	0	33	67	6	25	0	41	19	81	81	19	50	50	0	23	11
Hepatitis	0	20	8	0	62	25	25	50	50	83	16	16	16	66	50	60

Albuminuria was present in many of the patients with surgical jaundice, and in half of the patients with cirrhosis. Marked bilirubinuria was noted mostly in those with malignant obstruction and with hepatitis. Large amounts of urobilinogen were present in the urine, chiefly in the patients with medical jaundice and in those with benign obstruction (Table 8).

Half of the surgical cases had a blood nonprotein nitrogen level of over 40 mg. per 100 cc. Very low prothrombin values were found for the most part in cases with malignant obstruction and cirrhosis. An alkaline phosphatase value of over 15 Bodansky units and a serum cholesterol concentration above 300 mg. per 100 cc. was noted in about one third of the surgical cases. An icterus index of above 150 was found only in cases of malignant obstruction or hepatitis (Table 9).

Patients with malignant obstruction or cirrhosis usually had low values for serum protein. Serum albumin levels below 2.5 grams per 100 cc. were observed in a significant percentage of cases, only in cirrhosis and in hepatitis.

TABLE 8

Percentage Incidence of Abnormal Urinary Findings

Type of Jaundice	Albumin	Bilirubin			Urobilinogen		
		Trace	1–2+	3–4+	0 – Trace	1–2+	3–4+
Malignant obstruction	75	4	13	83	86	14	0
Benign obstruction	24	20	18	62	55	21	24
Cirrhosis	50	27	27	47	41	33	26
Hepatitis	0	13	13	75	63	13	25

TABLE 9

Percentage Incidence of Abnormal Results in Some Hepatic Function Tests

Type of Jaundice	Serum N.P.N. (mg./100 cc.)		Prothrombin (%)			Serum Alk. Phosphatase (B.U.)			Serum Cholesterol (mg./100 cc.)				Icterus Index			
	less than 40	over 40	less than 50	50–70	over 70	less than 8	8–15	over 15	less than 150	150–199	200–299	over 300	less than 50	50–99	100–149	over 150
Malignant obstruction	49	51	40	40	20	16	29	56	12	23	32	32	23	18	23	36
Benign obstruction	51	49	25	0	75	7	45	48	4	12	50	34	46	27	8	19
Cirrhosis	75	25	33	17	50	73	14	14	50	33	17	0	59	18	12	12
Hepatitis	100	0	0	100	0	71	14	14	43	14	43	—	0	38	25	38

A high serum globulin concentration was found in 49 per cent of the patients with cirrhosis and in a lesser percentage of those with other types of jaundice. The gamma globulin concentration was also elevated in all patients with cirrhosis and in about half of those with benign obstruction. A high titer (3 plus to 4 plus) of cephalin flocculation and high thymol turbidity (over 15 units) were found chiefly in the medical types of jaundice (Table 10).

COMMENT

Incidence

Since the second World War the incidence of jaundice has risen greatly. This increase appears to have been mainly in the non-obstructive or medical type (hepatitis and cirrhosis), despite the fact that better diagnostic technics have resulted in earlier diagnosis and discovery of more cases of the obstructive type. The higher incidence of hepatitis has been brought about by several factors: 1) Many men and women in the armed services had viral hepatitis of one (IH) or the other type (HS) during their tour of duty. 2) The great increase in the use of parenteral medications and blood products has resulted in an increase in homologous serum jaundice, not only in army personnel but also in the civilian population. 3) Several drugs have been introduced into the therapeutic field during the past fifteen years which, although useful, are

TABLE 10

Percentage Incidence of Abnormal Values for Serum Protein and for Flocculation and Turbidity

Type of Jaundice	Total Protein (Gm. %)		Albumin (Gm. %)			Globulin (Gm. %)			Gamma Globulin (Gm. %)		Ceph. Flocc.			Thymol Turb. (units)		
	less than 5.5	over 7.0	less than 2.5	2.6–3.5	over 3.5	less than 2	2.3–3.0	over 3	less than 2	over 2	0–1+	2+	3+–4+	less than 10	10–15	over 15
Malignant obstruction	24	7	14	56	30	10	56	37*	77	18	80	5	15*	90	5	5
Benign obstruction	16	31	17	37	47	12	40	48*	50	50*	67	11	22	77	15	8
Cirrhosis	29	14	36	46	18	9	32	59	0	100	24	8	68	54	23	23
Hepatitis	14	14	38	25	38	13	50	38	83	17	13	0	87	25	38	38

* The high globulin, gamma globulin and cephalin flocculation values were caused by the high incidence of cases with secondary hepatitis.

in some instances hepatotoxic or icterogenic. During this same period, many industrial hazards have also appeared, thus increasing the potentialities of hepatic damage. 4) There has been an increase in the incidence of cases of cirrhosis and jaundice, the explanations for which are as yet equivocal. In addition to the foregoing factors there has been an increase in our elderly population due to the steadily increasing life span. Since many older persons have to undergo various therapeutic procedures which demand new drugs, parenteral therapy, and blood transfusions, there has been a parallel increase of hepatitis in this group. Jaundice in an older individual should, therefore, not be considered a priori as due to mechanical obstruction, because another type of jaundice may be present.

Diagnosis

Although the statement of Moynihan that no man is infallible in the diagnosis of jaundice holds true, nevertheless we feel that a careful history, physical examination and intelligent evaluation of the available laboratory results will usually lead to a correct diagnosis. Clinical experience gained from seeing a great number of jaundiced patients may additionally lessen the number of errors. Moreover, the treatment of jaundice is not an emergency procedure, so that sufficient time may be taken to explore all possible diagnostic steps before definitive therapy is instituted. However, a diagnosis should be made as early as possible so that, if surgical treatment is required, there is no undue delay. Prolonged delay may lead to secondary liver damage.

Pain. Although the presence or absence of pain is considered to be an important differential point in diagnosis, it does not appear too reliable in elderly individuals. In them, only 56 per cent of the benign and 63 per cent of the malignant obstructive group had localized, abdominal pain. In comparison, 17 per cent of the patients with cirrhosis and 28 per cent of those with hepatitis had such symptoms. Thus it seems that both types of surgical jaundice, whether due to a

benign or to a malignant obstruction, may mimic intrahepatic disease if they are painless.

In our series of patients 60 years of age and over, painless jaundice (except for generalized abdominal discomfort) was noted in 37 per cent of the malignant and 44 per cent of the benign obstructive group. This finding is an accord with observations that elderly people also have a less marked pain response to other abdominal lesions, *e.g.*, appendicitis. The lessened pain response in the aged would explain some discrepancies in the incidence of pain reported in other studies. In a series of jaundiced patients of all ages, Weir (1) found painless jaundice in about 10 per cent of those with benign obstruction and in about 40 per cent of those with the malignant type. One of us (F. S.), in a previous unpublished study of jaundiced patients of all ages, found that 13 per cent of those with benign obstruction and 53 per cent of those with the malignant type had no complaints of pain. In the younger jaundiced individual, therefore, the absence of pain is of more diagnostic significance than in the aged.

Occasionally acute intrahepatic disease may give rise to severe, right upper-quadrant pain, simulating an acute attack of cholecystitis. Such a finding was noted in 14 per cent of 70 cases of acute hepatitis in all age groups (unpublished data) but not in the older groups. It should be emphasized, however, that the incidence of pain must also be considered in relation to the type of patient studied. It can be assumed that, among patients of a charity hospital, there will be a greater number of cases of painless jaundice than among patients in a private clinic.

In cases of hepatitis and of cirrhosis, the factors discussed for pain as a symptom seem to hold good also for pain as a sign. Thus a larger percentage of patients of all ages had tenderness over the liver on pressure, in comparison to those in the older age group. In the latter group, however, more patients with surgical jaundice had tenderness on pressure over the liver region. This may have been due in part to a more advanced process, as judged by nodularity of the liver. This condition was found in 63 per cent of the patients 60 years of age and over, but only in 18 per cent of those of all ages.

Hepatitis. In taking the history in a case of jaundice it is important to determine whether the patient has been exposed to cases of infectious hepatitis, whether he has received any parenteral therapy (including blood or blood derivatives), whether he has been taking some new medication, whether he has been exposed to some industrial toxic substance, or whether he has had any upper respiratory or gastrointestinal diseases recently. Any of these may point to the presence of hepatitis. On the other hand, previous digestive disturbances and colics may suggest a benign obstruction. Despite the fact that fever, chills, malaise, anorexia and nausea may precede jaundice in hepatitis, these are not very frequent complaints of the older patients suffering from this disorder. This point is illustrated by the occurrence of fever and chills in 30 per cent and 15 per cent, respectively, of the acute hepatitis cases among jaundiced patients of all ages, compared with the absence of fever or chills in the present series of cases among patients 60 years of age and over. This difference may in part be explained

by the higher incidence in the younger groups of the epidemic type of acute hepatitis with its febrile upper respiratory phenomena. On the other hand, chronic symptoms like intermittent nausea and diarrhea, were more frequently complained of by the patients of the older age group. Similarly, hematemesis, melena and swelling of the abdomen were found more frequently in the older cirrhotics.

Hepatomegaly and miscellaneous clinical signs. Very large livers were found in cases of malignancy, cirrhosis and hepatitis, in that order. In the older age group, however, many patients with benign obstruction had large livers due to associated pathologic conditions, such as vitamin deficiency (alcoholic) or biliary cirrhosis. However, in many old cirrhotics the liver and spleen were not felt because of massive ascites. A palpable, soft, gallbladder which is definitely an indication of obstructive jaundice was found in only a few of the surgical (malignant) cases, and an enlarged, hard, nodular gallbladder, characteristic of malignancy in this organ, was not observed in this series.

The presence of spider nevi, distended abdominal veins, ascites and edema favors a diagnosis of cirrhosis with jaundice, but pallor, factitial dermatitis and other abdominal masses point more to a malignant type of obstruction. All these findings were noted more often in the higher age groups. Because of the peculiar state of the skin in these older patients, the tint of the icterus—reddish in hepatitis, and greenish in the obstructive types—was of little differential diagnostic help.

Laboratory tests. Just as the differences in the clinical findings in these elderly jaundiced patients were not too striking, the differences in the laboratory findings in the various groups also failed to be pathognomonic. Although certain results showed trends in either the medical or surgical type, there was too much overlapping for any definite conclusions. Roughly it might be stated that the patient with malignant obstructive jaundice is more likely to have severe icterus, a low red blood cell count, albuminuria, a serum nonprotein nitrogen value of over 40 mg. per 100 cc., an alkaline phosphatase of over 15 Bodansky units, a total cholesterol of over 300 mg. per 100 cc., and a low total protein level. In benign obstructive jaundice most of these phenomena may be present to a lesser degree and less frequently. A low white blood cell count, neutropenia, a monocytosis, prothrombinopenia, severe icterus, and high thymol turbidity point to hepatitis. In a patient with non-obstructive jaundice, albuminuria, moderate bilirubinuria, moderate icterus, a high level of serum nonprotein nitrogen, globulin and gamma globulin, and a low level of total protein frequently indicate cirrhosis. A low serum cholesterol level (below 150 mg. per 100 cc.), a low concentration of serum albumin and marked cephalin flocculation (3 plus to 4 plus) usually occurs only in the medical types of jaundice.

Other difficulties in differential diagnosis. The difficulty in classifying the individual patient according to a specific type of jaundice by the foregoing criteria arises from the many variations encountered in almost every type. Some of these variations may be due to associated diseases which modify the usual body response to a certain stimulus; others may actually represent additive

effects, *e.g.*, purulent hepatitis and biliary cirrhosis in the obstructive types of jaundice; and still others may be the result of a counteracting mechanism, *e.g.*, lowering of the serum gamma globulin level in obstructive jaundice. In aged icteric patients these variations may be even greater, in view of the changes in metabolic processes that occur with aging.

The differential diagnosis is made even more difficult because of the high incidence of intrahepatic obstruction in patients with jaundice 60 years of age and over, as manifested by absence or only traces of urobilinogen in the urine. Hepatitis with intrahepatic obstruction should be considered in any old person 1) who has a history of having taken some of the newer icterogenic or hepatotoxic drugs, 2) whose associated symptoms suggest that he might have been given some substances currently used for alleviating nausea, hiccups, or depression, or 3) who has received male hormones, or some of the anticonvulsants. Intrahepatic obstruction, moreover, is commonly found in patients with homologous serum jaundice or toxic hepatitis, and in those with fatty liver and jaundice.

A few unimpressive differences were noted when comparison was made of the results of laboratory tests in two groups of jaundiced patients of all ages with those in the group aged 60 or over. Thus, in the extrahepatic or surgical types of jaundice, the mixed-age group showed a higher incidence of cephalin flocculations in the 3 plus to 4 plus range, whereas the incidence of thymol turbidity values exceeding 5 units and a gamma globulin level over 1.5 Gm. per 100 cc. was greater in the 60-and-over age group. A serum alkaline phosphatase level of over 15 units per 100 cc. was noted with almost equal frequency in both groups (Table 11). Similar results were obtained in the cirrhosis patients, except that a gamma globulin level of over 1.5 Gm. per 100 cc. was noted in all those aged 60 and over, but in only 83 per cent of those below 60. Among the hepatitis patients, there was again a similarity in the various results, except that there was a higher incidence of thymol turbidities above 5 units in the older age group, and a higher level of serum albumin was found more often in the mixed-age group (Table 11).

In prolonged cases of jaundice, other diagnostic aids are usually brought into the foreground. Of these, x-ray studies of the gastrointestinal tract may prove helpful, as they may eliminate or elicit some underlying lesions in this system. Attempts at gallbadder visualization in patients with severe icterus are usually not successful, although some of the newer procedures appear promising. A flat plate of the abdomen may reveal some calcified areas. It should, however, be kept in mind that the finding of a lesion in the gastrointestinal tract or of a calcific shadow in the gallbladder area is not always the discovery of the cause of the icterus, unless most of the other test results point in the same direction.

Therapeutically the aged patient with jaundice is much more of a hazard than his younger counterpart. All patients must be treated as a whole, but the old person with jaundice doubly so. It is impossible to treat his jaundice and neglect his anemia, malnutrition, heart, lungs, kidneys, urinary bladder, or bowels. Attention must be paid to all systems, since by preventing additional

TABLE 11

Comparison of Laboratory Data in Various Types of Jaundiced Patients from Two Different Age Groups

	All Age Groups. Per cent of cases							Over 60 Years of Age. Per cent of cases						
	C. Flocc. 3+–4+	T. Turb. over 5 u.	Alb. over 3.0 Gm. %	Glob. over 3.0 Gm. %	Gamma G. over 1.5 Gm. %	Chol. over 300 mg./100 cc.	Alk. Ph'ase over 15 B.U.	C Flocc. 3+–4+	T. Turb. over 5 u.	Alb. over 3.0 Gm. %	Glob. over 3.0 Gm. %	Gamma G. over 1.5 Gm. %	Chol. over 300 mg./100 cc.	Alk. Ph'ase over 15 B.U.
Extrahepatic obstruction	31	26	—†	—†	32	38	57*	18	40	—†	—†	52	33	52
Cirrhosis	74	69	—†	—†	83	6	6*	75	80	18	59	100	0	14
	90	90	0	72	—†	0	18**							
Hepatitis	82	75	—†	—†	57	17	5*	85	100	38	38	50	0	14
	90	90	60	30	—†	0	30**							

* Cases from our clinic in a different study.

** Cases from a different clinic.

† Tests not made.

insults to the liver from other disturbances in the body, healing of the original injury is encouraged. It has to be taken into account that elderly patients may not be able to consume the high caloric diets usually given to those with hepatic jaundice, that they may be unable to metabolize the large amounts of protein, that they have altered metabolic processes in relation to carbohydrates (5) and fats (6), and that they have in general a lower metabolism. Nevertheless, judicious use of all available present-day measures which are therapeutically proven in the treatment of jaundice, plus the careful management of the patients' other symptoms, may prove satisfactory, even in the older jaundiced patient.

SUMMARY

Despite the increased incidence of nonobstructive jaundice due to hepatitis and cirrhosis, obstructive jaundice from benign or malignant causes is still the more prevalent type in patients 60 years of age and over.

Hepatitis or cirrhosis with jaundice, however, is not uncommon in patients over 60 years of age, and must be ruled out in any jaundiced person regardless of the age group.

Certain clinical and laboratory findings predominate in each type, but overlapping is so common that they must be carefully weighed and evaluated before a definite diagnosis is made.

In the older age group there is a higher incidence of the more pronounced clinical and laboratory abnormalities. Thus therapy in these patients must be more intense and more all-inclusive, but also more circumspect.

REFERENCES

1. Weir, J. F.: Differential diagnosis of jaundice in surgical practice, *Arch. Surg.* **59:** 793, 1949.
2. Bockus, H. L.: Gastroenterology. Philadelphia and London, W. B. Saunders Company, 1946, vol. 3, p. 185.
3. Collins, S. D.: A review of illness from chronic disease and its variation with age, sex and season, with some trends, *J. Chronic Dis.* **1:** 412, 1955.
4. Hyman, S., and Steigmann, F.: Gallbladder disease in men: need for earlier diagnosis and treatment, *Am. J. Dig. Dis.* **18:** 337, 1951.
5. Chesrow, E. J., and Bleyer, J. M.: The glucose tolerance test in the aged, *Geriatrics* **9:** 276, 1954.
6. Becker, G. H.; Meyer, J., and Necheles, H.: Fat absorption in young and old age, *Gastroenterology* **14:** 80, 1950.

THE DILEMMA OF GASTRIC ULCER—BENIGN OR MALIGNANT?

A Plan of Management for Geriatric Patients*

BROCK E. BRUSH, M.D. and ROBERT J. PRIEST, M.D.

The Divisions of General Surgery and Gastroenterology, Henry Ford Hospital, Detroit, Michigan

The diagnosis of gastric ulcer in geriatric patients presents the physician with a dilemma. A choice must be made between the risk of surgery and the risk of medical management for a possibly malignant ulcer. Smith and Jordan (1) have stated that gastric ulcer "is not so perilous that the patient who has it cannot be treated as an individual case, rather than by a general policy of resection of all cases." This philosophy of considered judgment applies particularly to the group of patients past 60 years of age.

Every technical and clinical aid should be used in the differential diagnosis of benign from malignant gastric ulcer. Marshall (2) has stated that it is evident that 95 per cent or more of ulcers thought to have become malignant are, in reality, malignant from the onset. He summarizes the problem as "discussing the early diagnosis of cancer, rather than discussing the question of malignant degeneration on a benign ulcer."

The importance of early diagnosis and early operation have been the main objectives of cancer education. The five-year survival rate following gastric resection for small gastric cancers is 40 per cent greater than that for patients with gastric cancer of all sizes. In general, the smaller the cancer the higher the five-year survival rate (3). The smaller growths seem to have a lower incidence of high grades of malignancy. Ravdin and Horn (4) recommend a more radical approach to the gastric ulcer problem if the results of surgery for cancer of the stomach are to be improved.

In an attempt to determine the possible dangers of individual management of these lesions, we have reviewed our diagnostic criteria and the results obtained therefrom in the management of 392 patients.

The evaluation of every patient with gastric ulceration as an individual problem seems more imperative in the geriatric age group than in younger patients An inexcusable delay in the surgical removal of a malignant ulcer may be avoided if the proper criteria for diagnostic studies and clinical re-evaluation are maintained. On the other hand, the successful healing and continued surveillance of a benign gastric ulcer in a geriatric patient may obviate a major surgical operation.

METHODS

Technical diagnostic procedures

In the differential diagnosis of benign gastric ulcer from gastric malignancy the following diagnostic procedures should be used before a final opinion of benignity or malignancy is given.

* Presented at the Annual Meeting of the American Geriatrics Society, New York, N. Y., April 21–22, 1955.

1. Roentgen examination of the stomach with careful fluoroscopy and examination of film studies.
2. Gastric analysis.
3. Gastroscopy.
4. Cytologic study of gastric aspiration material.
5. Trial of medical therapy during bed rest in the hospital.
6. Progress x-ray studies at suitable intervals.
7. Progress gastroscopic observation.
8. Careful re-evaluation of progress by diagnostic procedures.

History

The clinical differentiation of benign from malignant gastric ulcer is difficult. In this series 42 per cent of the patients had symptoms less than one year. Many patients had had recurrent and periodic ulcer pain for from five to forty years. Anorexia, weight loss, anemia, and nausea are common in both benign and malignant conditions. Complete reliance on the long duration of symptoms cannot be trusted as an index of benignity. Any symptoms of acute or chronic ndigestion in a geriatric patient require careful study.

X-ray examination

Roentgen examination of the stomach does not always provide accurate differentiation of benign from malignant ulceration. Most malignant lesions are recognized promptly. A large crater located on a plateau, a subtraction defect, polypoid deformities, or extensive stiffening of the gastric wall are recognized as probable malignant lesions. There are no absolute signs of the benignity of a gastric ulcer. Mucosal folds converging toward the crater, and an ulcer outline projecting from the lesser curvature are suggestive of a benign lesion. However malignant lesions may be small, may perforate, and become walled off. Griffin (5) has presented evidence of the unreliability of accepting all greater curvature ulcers as malignant lesions. Comfort *et al.* (6) have stated "the smaller the gastric cancer the more it lacked the roentgenologic features of malignancy." The limitations of x-ray diagnosis must be recognized and the clinician should correlate such findings with other diagnostic procedures.

Gastric analysis

Gastric analysis should be included in a complete study. Every gastric ulceration in the presence of a histamine-refractory achlorhydria requires prompt surgical removal. Although acid secretion may be lower than normal in patients with gastric ulcer, the presence of some free acid is essential for any further consideration of benignity. Malignancy frequently occurs in the presence of a normal acid secretion and the presence of acid does not preclude the diagnosis of malignant ulcer.

Gastroscopy

Gastroscopy is of assistance in differential diagnosis if the lesion is seen. A benign ulcer tends to have a distinct margin. The malignant ulcer may be more irregular and seemingly located on an elevation. The observation of healing in the ulceration is particularly valuable.

Cytologic studies

Rubin *et al.* (7) have described a new method involving the use of an antral abrasive balloon to make more precise the study of exfoliative cytology in the stomach. This technique deserves a more extensive application in differential diagnosis of gastric lesions.

Management

If the initial studies do not reveal any precise indications for prompt surgical intervention, a trial of medical management should be made. In the geriatric group, the importance of the arteriosclerotic factor in ulcer etiology has long been recognized. It is recommended that the medical regimen be started during a period of physical and mental rest in a hospital bed. In this way the nutrition of the elderly patient can be supervised and he can be instructed in the regularity of antacid therapy, and anticholinergic and sedative medications. The medical management may be continued at home with more hope of success after an initial period of proper training in the hospital. A responsible member of the patient's family should also be instructed in this program.

Most benign gastric ulcers show partial healing within three weeks and complete healing within four to six weeks. Any delay in healing beyond this time limit is considered an indication for surgical intervention in our clinic. Levin, Palmer and Kirsner (8) have emphasized that "the most helpful diagnostic approach is the repeated gastroscopic and roentgen examination of the patient during a strict antacid program in the hospital."

It cannot be overemphasized that the physician bears the responsibility for periodic re-evaluation of gastric lesions. It is essential to check the progress of the disease by roentgen examination of the stomach at intervals of two to three months after complete healing of the original ulcer. Recurrent ulceration is considered a definite indication for surgical removal.

PRESENTATION OF DATA

Among 392 patients in whom a diagnosis of gastric ulcer was made at Henry Ford Hospital, 78 were above 60 years of age. This geriatric group represented 1 out of every 5 gastric ulcers surveyed. The average age of these 78 patients was 64.3 years, the oldest being 83. Of these 78 patients, 60 were males and 16 were females—a ratio of 4:1.

Gastrectomy was performed in 45 of the 78 geriatric patients (58 per cent), whereas in a group of 392 gastric ulcer patients of all ages, gastrectomy was performed in 175 (45 per cent). The higher incidence of operative intervention in

TABLE 1

Indications for Operation in 45 Geriatric Patients with Gastric Ulcer

Question of malignancy		38
Initial x-ray and clinical opinion	26	
Lack of x-ray improvement	8	
Recurrent ulceration	4	
Hemorrhage		3
Obstruction		3
Perforation		1

TABLE 2

Clinical Gastric Ulcers—X-ray Location

Lesser curvature	46
Pyloric antrum	22
Pylorus	9
Greater curvature	2
Cardia	2
Not seen	1
Total	82

the patients above 60 reflected a greater index of suspicion regarding malignancy in the geriatric group. Benign gastric ulcers were found in 44 of the patients operated upon, and adenocarcinoma in only 1.

The indications for operation in the 45 surgical geriatric patients are presented in Table 1. It is to be emphasized that in 35 of the 36 patients in whom malignancy could not be excluded, subsequent pathologic examination proved the gastric ulceration to be benign. The single patient with a malignant lesion was observed to have an ulcer diminishing in size, but not healing completely over a period of four and one-half months.

In 33 patients symptoms were of less than one year's duration, and in 18 of these symptoms had been present for less than two months. Table 2 lists the locations of ulceration in the stomach. Multiple ulcers were seen by x-ray examination in 5 patients.

Gastric acidity was tested in 65 of the 78 patients. There was fasting anacidity in 21 of the 65 patients tested. After a stimulating test meal, 23 of the 65 patients had over 50 degrees of free acid and 39 had over 40 degrees of free acid. None had a histamine-refractory achlorhydria.

Gastroscopy was performed in 32 patients. The x-ray diagnosis of gastric ulcer was not confirmed by gastroscopic observation in 15 patients. Ulcerations considered malignant were observed in 7 patients and ulcers considered benign, in 10 patients. Subsequent pathologic study revealed that all the ulcers considered to be malignant were benign, and confirmed the opinion of benignity in 9 of the remaining 10.

An associated duodenal ulcer scar was found in 23 of the 78 patients. On x-ray examination, obstruction or delayed emptying of the stomach was observed

in 14 of 77 patients. Sixteen gastric ulcers healed in four weeks or less, and 24 ulcers healed completely in two months or less. Single examples were found of ulcer healing at three months and at six months.

An illustration of the need for careful observation of these patients is given in the following case report of a patient with an ulcer in which carcinoma was found:

A.A. (#640877), a 64-year-old male, presented a four-year history of epigastric distress relieved by antacid. He had been hospitalized elsewhere on four occasions for medical treatment of "duodenal ulcer." Tarry stools had been observed at intervals during the previous four years. When first admitted to Henry Ford Hospital, he complained of epigastric pain referred through to the back. He had lost 12 pounds in weight.

On physical examination there was neither lymphadenopathy nor palpable mass, but there was epigastric tenderness. The patient had diabetes mellitus. The hemoglobin level was 15 grams. The fasting gastric acidity was 22 degrees and the maximum free acidity was 46 degrees after a stimulating test meal.

Roentgen examination on April 7, 1951 revealed a rounded pocket of barium in the upper stomach (Fig. 1). One week later a roentgenogram showed the gastric ulcer to be smaller. On gastroscopy, a benign healing gastric ulcer was seen on the lesser curvature, high in the pars media.

A suprapubic prostatectomy was performed during the initial hospital stay. During the ensuing four months the patient was interviewed at intervals of three weeks. He remained free of gastric symptoms. Severe epigastric pain returned at the end of four months. A persisting gastric ulcer was seen upon progress roentgen examination. Partial gastrectomy was performed without further delay. The pathologic diagnosis was an ulcerating adeno-

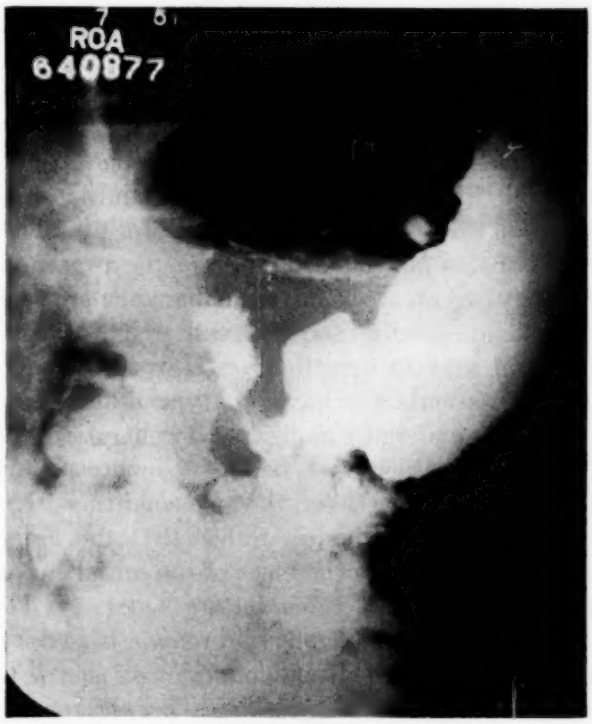


FIG. 1. Roentgenogram showing rounded pocket of barium high in the pars media of the stomach.

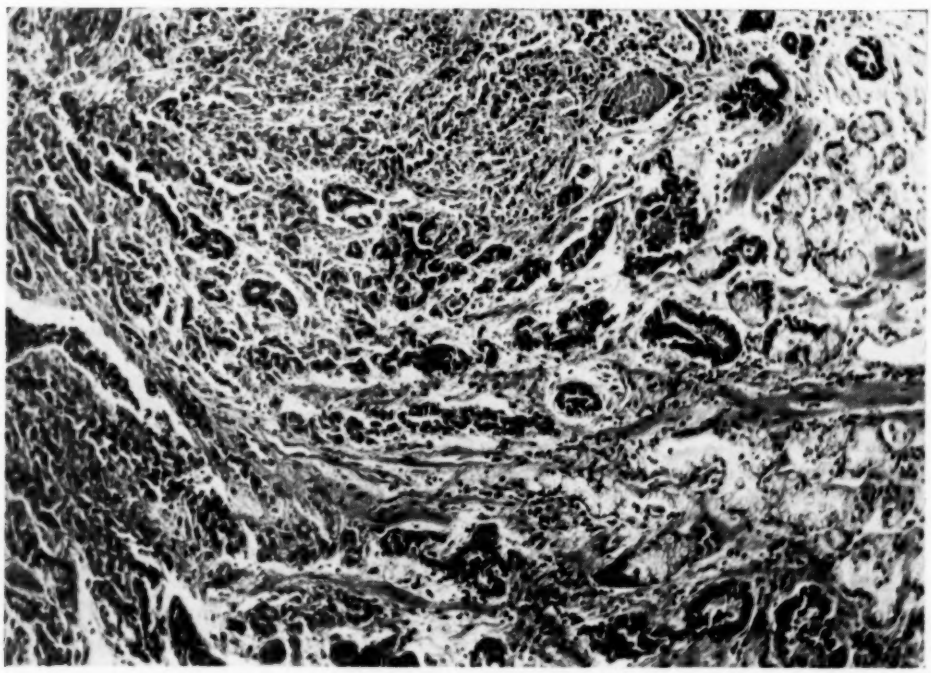


FIG. 2. Photomicrograph showing superficial ulceration in an early adenocarcinoma of the stomach.

carcinoma of the stomach (Fig. 2). Lymph nodes were not invaded. He has remained well for three and a half years.

DISCUSSION

Gastric carcinoma has long been known to be very difficult to treat successfully. Only in the past few years has resection been possible in 50 per cent of the patients operated upon. In the past, due to the advanced stage of the disease at the time of operation, very little could be done for about two thirds of the patients. Recognition of this fact has led to a greater awareness on the part of physicians that the early symptoms of gastric malignancy are vague and minimal. Slight anorexia, vague indigestion and distress, weight loss and fatigue are symptoms which should lead to investigation of the stomach. Of special importance is the group of patients who have an atypical ulcer history. Although a chronic gastric ulcer rarely undergoes malignant degeneration, the problem is the initial recognition of whether the ulcer is benign or malignant. Many techniques are now available to distinguish between the two conditions. However no single study will furnish results which give assurance that the lesion is benign. A diagnosis of cancer may be made on the basis of the initial survey; but to prove benignity a complete study and *re-evaluation* are necessary. The practical test for a benign ulcer is that it heal completely and remain healed.

When the findings strongly suggest malignancy (*e.g.*, gastric ulceration in the presence of anacidity), the lesion is diagnosed as cancer and removed immediately. We believe that the low incidence of malignancy in the gastric ulcers reported here is due to the fact that in suspected cases the lesion was considered malignant

and therefore resected. In several series (1–3), from 10 to 20 per cent of gastric ulcers were found to be malignant at operation. This general experience has led to more rigid diagnostic criteria and an increased suspicion of every gastric ulceration. If the initial roentgenographic examination and gastroscopy do not reveal a lesion in a patient with suspicious symptoms, these studies should be repeated periodically.

In our series it is noteworthy that the indication for surgery in 4 out of 5 instances was that malignancy could not be ruled out. The fact that only 1 out of 36 patients operated upon for probable malignancy proved to have cancer points up the fact that, when there was uncertainty, the condition was diagnosed as carcinoma and the lesion was removed.

When complete diagnostic evaluation and *re-evaluation* are applied, it seems possible in most instances to differentiate benign from malignant ulcerations of the stomach and thus to individualize therapy. However, when a gastric ulcer under medical management does not heal promptly and *remain healed* it should be excised without delay.

CONCLUSIONS

1. Gastric ulceration in the geriatric patient should be considered as an individual problem in differential diagnosis between cancer and a benign ulcer.
2. Diagnostic procedures for complete evaluation of a patient with gastric ulceration are reviewed.
3. Precise indications for prompt operative measures are outlined.
4. A trial of medical therapy in the hospital is recommended for those patients in whom the initial evaluation is reassuring.
5. When progress studies fail to demonstrate complete healing in from four to six weeks, prompt surgical intervention is recommended. The physician must assume responsibility for the recall of the patient for these studies.
6. It is mandatory at regular intervals to re-evaluate the patients in whom ulcers have healed completely under medical management.

REFERENCES

1. Smith, F. H., and Jordan, S. M.: Gastric ulcer: a study of 600 cases, *Gastroenterology* **11:** 575 (Nov.) 1948.
2. Marshall, S. F.: The relation of gastric ulcer to carcinoma of the stomach, *Ann. Surg.* **137:** 891 (June) 1953.
3. Walters, W.; Gray, H. K., and Priestley, J. T.: Carcinoma and Other Malignant Lesions of the Stomach. Philadelphia, W. B. Saunders Company, 1942.
4. Ravdin, I. S., and Horn, R. C.: Gastric ulcer and gastric cancer, *Ann. Surg.* **137:** 904 (June) 1953.
5. Griffin, B. G.: Benign ulcer of the greater curvature of the stomach, *Gastroenterology* **27:** 178 (Aug.) 1954.
6. Comfort, M. W.: Gray, H. K.; Dockerty, M. B.; Gage, R. P.; Dornberger, G. R.; Solis, J.; Epperson, D. P., and McNaughton, R. A.: Small gastric cancer, *A.M.A. Arch. Int. Med.* **94:** 513 (Oct.) 1954.
7. Rubin, C. E.; Massey, B. W.; Kirsner, J. B., and Palmer, W. L.: The clinical value of gastrointestinal cytologic diagnosis, *Gastroenterology* **25:** 119 (Oct.) 1953.
8. Levin, E.; Palmer, W. L., and Kirsner, J. B.: Observations on the diagnosis, treatment, and course of gastric ulcer, *J.A.M.A.* **156:** 1383 (Dec. 11) 1954.

Abstracts of Current Literature

CHOLESTEROL METABOLISM. EVALUATION OF POLYSORBATE 80-CHOLINE-INOSITOL COMPLEX (MONICHOL) FOR THE MANAGEMENT OF HYPERCHOLESTEREMIA.
Albert, A., and Albert, M. *Texas State J. Med.* **50:** 814 (Dec.) 1954.

Elevated serum cholesterol levels were significantly lowered by treatment with polysorbate 80-choline-inositol complex in 25 patients with (a) hepatic and biliary-tract disease, (b) diabetes mellitus, (c) cardiovascular disease, (d) idiopathic hypercholesteremia associated with obesity, or (e) hypothyroidism. Both subjective and objective improvement occurred. All patients reported a sense of euphoria. Serum cholesterol levels rose to pretreatment levels when therapy was discontinued but fell again when an average dosage of 2 teaspoonfuls twice daily was resumed. A favorable condition has been maintained for a year in some patients. Most of the patients with cardiovascular disease had anginal pain that was relieved by this therapy. These patients, with one exception, were in the older age group—57 to 76 years.

A SYSTEMIC APPROACH TO ARTHRITIS THERAPY.
Albertson, H. K., and Scholz, D. E. *Clin. Med.* **61:** 945 (Dec.) 1954.

Thirty-five patients with rheumatoid arthritis, osteoarthritis, gouty arthritis, generalized atherosclerosis, or bursitis were benefited by the intravenous administration of 3 to 10 cc. of Tracemin three times weekly for varying periods. This mineral solution contains several elements normally found in the plasma or serum and also present in ACTH. Changes in the serum levels of inorganic constituents were found to be related to clinical improvement. These findings appear to support the hypothesis that arthritis and related conditions are often associated with a disturbance in mineral balance.

AS THE ANESTHESIOLOGIST SEES THE SUNSET.
Anderson, C. D. *California Med.* **81:** 325 (Nov.) 1954.

Advanced age need not be a barrier to operation, in view of the expanding knowledge of the care of surgical patients. Changes in cellular structure resulting from disease or degeneration of the cardiovascular and respiratory systems, the kidneys, and the liver are of paramount importance in evaluating surgical risk in the elderly. Problems related to water and electrolyte balance must be managed according to the patient's physiologic age and any pathologic condition present. Blood volume and blood components are maintained by replacement therapy. Both preoperatively and postoperatively, a positive nitrogen balance is mandatory and is best accomplished by oral feedings. An adequate carbohydrate intake protects the patient's protein reserves from catabolic activities. Vitamins must not be overlooked as nutritional aids and in the maintenance of a positive nitrogen balance. Constant vigilance must be maintained against overdosage of anesthetic and analgesic agents in the elderly. The pharmacologic action of drugs in the elderly may vary from that in younger individuals. For example, ether may act as a myocardial depressant in older individuals in whom the aging process or disease has produced atrophy or depression of the adrenal or pituitary glands.

THE POSSIBLE ROLE OF THE VERTEBRAL ARTERY IN AMYOTROPHIC LATERAL SCLEROSIS. A PRELIMINARY REPORT WITH CASE STUDY.

Bendheim, O. L. *Arizona Med.* **2:** 444 (Dec.) 1954.

The vertebral artery was studied for perhaps the first time in relation to amyotrophic lateral sclerosis because of its intimate association with the central nervous system and cervical cord. In a 59-year-old patient with amyotrophic lateral sclerosis, an arteriogram demonstrated a complete loop formation of the vertebral artery at the area of the most marked hypertrophic changes near the third vertebra. This finding raised the question as to whether the blood flow could be sufficiently impaired to produce the pathologic changes in the central nervous system. Possibly the artery became fixed within the foramen transversarium of the third cervical vertebra by proliferative bone changes, so that a recoil phenomenon occurred. The relationship of the behavior of the artery to amyotrophic lateral sclerosis is under study. Surgical correction is contemplated, the results of which will be reported at a later date.

MEN IN THEIR FIFTIES.

Braceland, F. J. *J. Omaha Mid-West Clin. Soc.* **15:** 1 (Jan.) 1954; through *Digest. Neurol. & Psych.* **22:** 549 (Dec.) 1954.

The same types of emotional upset and mental illness occur in men and women in middle life, though in the former they ordinarily appear about a decade later and only half as frequently. In our culture, middle age is a period of major change and in many males it is a time of serious stress. The development of psychiatric symptoms at this time is due to a combination of stress and a predisposed personality makeup leading to difficulties in finding normal channels for the release of anxiety. Illness, business reversals, rebuffs, disappointments in family or in friends, failure of promotion, loss of face in business or in the community—all these assume serious proportions during middle life, when time seems to be moving rapidly. The psychiatric condition which appears in middle-aged men occurs in various degrees of intensity ranging from mild neurosis or depression to severe functional psychosis. Even the subclinical variety is capable of causing serious disability in both physical and emotional spheres. Complaints of fatigue, insomnia, early morning awakening, and loss of interest, make diagnosis easier; but often the patient complains only of vague, manifold symptoms. There may be irritability and diminished sexual drive. Symptoms referable to various bodily systems are common. At times the first evidence of trouble is the discovery that the patient is becoming more dependent on alcohol, or that he is seeking female companionship outside the home. In the psychotic reaction, depressions or paranoid ideas are frequent symptoms. The break with reality, when it comes, is gradual. The course is prolonged, however, unless electroshock therapy (as it often does) affords symptomatic relief. These patients, and even those with mild depressions, are suicidal risks. The illness is not directly caused by endocrine dysfunction and it is not improved by the administration of endocrine preparations. The difficulty is in the realm of personality relationships and the need for adaptations and adjustment to the changing conditions called for in middle and later life. Except for the frank psychoses and the obvious deep neuroses, emotional problems of men in their fifties can be treated by the general practitioner with the simple forms of psychotherapy, provided he has some knowledge of the dynamic reactions of personality and exhibits some obvious degree of warmth and understanding. Unless the precipitating illness is in the occupational milieu, the individual should be kept at work. If it is necessary to remove him from the environment for a while, care should be taken that he not be idle. Every effort should be made to keep these patients from making major changes in their work or in their overall situation until they are able to consider more objectively all aspects of the problem.

RELATION OF NUTRITION TO HEALTH IN AGING PERSONS. A FOUR-YEAR FOLLOW-UP OF A STUDY IN SAN MATEO COUNTY.

Chope, H. D. *California Med.* **81:** 335 (Nov.) 1954.

A follow-up study was made of 577 San Mateo County residents over 50 years of age, who were originally studied in 1948. Three hundred and fifty still were available for re-evaluation. Mortality studies showed a higher death rate in males than in females, in persons of the lower economic levels, and in those with a systolic blood pressure of more than 180 mm. Hg. Correlations between factors studied and morbidity were not conclusive, but suggested relationships between low economic status and digestive-system disease; low hemoglobin concentration and high incidence of respiratory disease; high caloric intake and digestive-system disease; low thiamine intake and nervous-system disease; and low ascorbic-acid intake and diseases of the circulatory and digestive systems. (From editor's summary.)

PSYCHIATRIC PATIENTS LOOK AT OLD AGE: LEVEL OF ADJUSTMENT AND ATTITUDES TOWARD AGING.

Feifel, H. *Am. J. Psychiat.* **3:** 459 (Dec.) 1954.

In a study by questionnaire, 38 acutely disturbed patients and 47 psychoneurotics and patients with character and behavior disorders had favorable attitudes toward childhood, adolescence, and the early years of maturity but held a negative perspective toward later years of life. Neither age nor degree of mental disturbance affected this attitude. Both groups of patients, with mean ages in the 30's, regarded this period as the most favorable for the aspects of "living a full life," "meaningfulness of life," "job satisfaction," "activity in family affairs," and "clubs and organizations." Many thought that the time for many favorable aspects of life had already passed by this age period. This negative orientation to later years of life is consonant with attitudes reported in the literature for "normal" individuals. Attitudes toward old age appear to be largely determined by a widespread social attitude or ideology rather than by idiosyncratic experiences. The results of this study indicate a need for an educational program to train people for adjustment to old age. Evidence is accumulating that age changes are not uniform, and that not only do individual differences exist but intra-individual variations as well. Data increasingly suggest that the manner in which the culture treats and reacts to aging, as well as the person's own concept of what it means to grow old, may be the cause of more psychologic difficulties than the aging process per se. A re-evaluation of our thinking concerning old age is indicated.

NUTRITION AND RELATED PROBLEMS.

Jones, I. H.; Muckleston, H. S., and Hilger, J. A. *Laryngoscope* **64:** 973 (Dec.) 1954.

This is a review of recent literature on the subjects of nutrition, endocrines, autonomic influence, stress, and allergy. These subjects are followed because of realization of their relationship to each other and to otolaryngology. This concept has proved helpful in the cases of patients whose symptoms have no obvious cause and particularly in those in whom the history and findings offer no clue to diagnosis.

A NEW LOOK AT THE OLD TICKER.

Klumpp, T. G. *West Virginia M. J.* **50:** 349 (Dec.) 1954.

In this address it is pointed out that heart attacks, apoplexy, and the like are probably the culmination of a gradual process of arteriosclerosis rather than of the stress and strain of modern living, as we are constantly conditioned to believe. The maintenance of moderate activity and the avoidance of overeating with resultant obesity should provide a way of life to help overcome this degenerative process.

RAUWOLFIA SERPENTINA. PROLONGED USE IN ELDERLY HYPERTENSIVE PATIENTS.

Lipsett, M. B.; Levine, A. H., and Goldman, R. *California Med.* **81:** 412 (Dec.) 1954.

Twenty-two arteriosclerotic hypertensive patients, aged 54 to 71 years, were followed during treatment for more than a year with Rauwolfia serpentina. One or two tablets containing 2 mg. of alseroxylon fraction were administered at bedtime. Some of the patients had been hypertensive for more than five years. In 17 of the group, the drug had a mild hypotensive effect after varying periods of treatment. Fourteen patients received placebos at the end of sixty-two weeks, and in 12 a rebound in blood pressure occurred. Most of the patients volunteered that they felt better during treatment. Of the 13 with headache or vertigo, 8 at some time noted relief of these symptoms. Five patients had increased frequency of bowel movements at the start of therapy. One patient experienced vertigo after eight months. There were no hypertensive cardiovascular complications. Blood cell counts, blood urea nitrogen determinations, and cephalin flocculations and thymol turbidity tests at the end of the study showed normal values.

ATRIAL SEPTAL DEFECTS IN PATIENTS PAST MIDDLE AGE.

Lyons, H. A., and Kelly, J. J., Jr. (Meeting of Am. Fed. Clin. Res., May 1955) *Clin. Research Proc.* **3:** 107 (Apr.) 1955.

An interatrial septal defect is, in the authors' experience, the most common type of congenital heart disease seen in middle age. In a two-year period they observed 11 patients over the age of 45 with this lesion, but recognized only 2 examples of other types of congenital heart disease in this age group. The diagnosis was verified by cardiac catheterization in 8 of these subjects. The data obtained from cardiac catheterization, as well as from a variety of other laboratory technics (electrokymography, ballistocardiography and, phonocardiography), demonstrated the wide range of physical findings. For example, 2 subjects of 70 and 72 years of age had very high pulmonary blood flows without pulmonary hypertension. With advancing age the usual clinical manifestations of an atrial septal defect are frequently so altered that the diagnosis is often not suspected. With an awareness of the various manifestations of this disease, a high degree of accuracy may be achieved in establishing the diagnosis of the disorder and its complications, by the usual clinical methods plus ancillary use of the phonocardiogram and ballistocardiogram. Recourse to cardiac catheterization is not necessary.

EXTRINSIC DEFORMITIES OF THE COLON MIMICKING CARCINOMA. A REPORT OF THREE CASES.

Overton, R. C.; Bolton, B. F., and Usher, F. C. *Surgery* **36:** 906 (Nov.) 1954.

Extrinsic lesions may cause constriction of the colon, with symptoms and roentgenographic characteristics suggesting carcinoma. The more common causes are usually readily explained. Infrequently, diaphragmatic hernia, localized colon spasm, unsuspected retroperitoneal masses, and congenital defects and bands may account for these confusing extrinsic deformities. Three cases are described, which were erroneously diagnosed preoperatively as carcinoma of the colon, but were found at operation to be benign extrinsic constrictions. In 2 of the cases, the constriction was due to appendices epiploicae and in the third case to a circular fibrous ring. (From authors' summary.)

THE OXIMETER-CONTROLLED INDUCED ANOXEMIA TEST FOR CORONARY ARTERY DISEASE.

Penneys, R. (Meeting of Am. Fed. Clin. Res., May 1955) *Clin. Research Proc.* **3:** 111 (Apr.) 1955.

Forty-nine experiments are reported (36 on "coronary suspects" and 13 on healthy, middle-aged subjects), using a technic which controls the hypoxemic stress according

to the level of the blood arterial oxygen saturation, as measured by oximeter. The arterial saturation was lowered to an average of 75 per cent for each group of subjects. These experiments demonstrate that: 1) The desired level of saturation can be produced and maintained in these patients as easily as in healthy volunteer subjects. The procedure is safe if the saturation is lowered gradually and if pure oxygen is promptly substituted for diluted oxygen, should angina be induced. 2) The maximum electrocardiographic changes (in the RS-T segment and T wave) in middle-aged, healthy subjects do not exceed those in younger healthy subjects, so that our previously described criteria for a "positive" response are still valid. 3) The ballistocardiogram (Starr type) supplies important information during hypoxemia; in the coronary suspects the ballistic form was abnormal in 10 of 11 positive responses, as determined by electrocardiographic changes or induction of angina, but remained normal in the healthy subjects. In 1 instance of induced angina the ballistic form deteriorated markedly while the electrocardiogram remained normal. It is concluded that the oximeter-controlled induced anoxemia test is a useful "stress" test for coronary artery disease, especially when objective evidence of coronary insufficiency is desired.

THERAPY IN INTERMITTENT CLAUDICATION.

Pomeranze, J.; Gadek, R. J.; Pitman, E. R., and Scherl, S. *Angiology* **6:** 271 (June) 1955.

A pharmacologic evaluation of phenyl-1-butyl-norsuprifen (Arlidin) indicates increased cardiac output, marked peripheral vasodilation, with a low incidence of acute toxicity. Twenty-four diabetic patients received Arlidin in oral dosages ranging from 3 mg. three times a day to 12 mg. three times a day. Nineteen of the patients experienced considerable relief of intermittent claudication or nocturnal muscle cramps during Arlidin therapy as contrasted with placebo therapy. Slight dizziness and weakness, complained of by 2 patients, were the only side effects observed. Arlidin is recommended as a vasodilator effective in alleviating intermittent claudication and nocturnal muscle cramps when given as part of the over-all therapy of peripheral vascular disease and associated spasm.

PATHOGENESIS AND SURGICAL MANAGEMENT OF ACUTE GASTRIC EROSIONS.

Sarason, E. L., and Levy, B. F., Jr. *New England J. Med.* **251:** 769 (Nov. 4) 1954; through *Gen. Pract. Digest* **1:** 10 (Dec.) 1954.

Acute superficial gastric erosions are distinguished from acute peptic ulcers by the fact that they are more shallow, and never invade gastric tissue any deeper than the muscularis mucosae. Because they are so shallow, they are often undetected by the radiologist, gastroscopist, or surgeon. However, they can be the source of massive hemorrhage manifested by massive hematemesis. When this hemorrhage remains uncontrolled, such erosions present a distinct surgical emergency. The author recommends that hemorrhage be controlled by a wide gastrectomy rather than by a "blind gastrectomy" procedure. These gastric erosions probably have a neurogenic etiology, being associated with inflammatory, vascular or neoplastic cerebral lesions that do not involve the midbrain or hypothalamus. They may also occur as a result of the body's response to severe "stress" situations.

USE OF PLACENTAL SERUM IN THE TREATMENT OF RHEUMATOID ARTHRITIS.

Tufts, M. *Wisconsin M. J.* **53:** 615 (Dec.) 1954.

Major improvement in rheumatoid arthritis occurred in 16, and minor improvement in 4, of 22 patients treated with placental blood serum alone, following other medications, in combination with cortisone and salicylates, or in combination with physical therapy. Two patients received no benefit. The serum was administered in 5-cc. doses intramuscularly, intravenous injection having been abandoned. Injections were made twice weekly for two weeks and then weekly for eight weeks. The serum had no toxic effects and no withdrawal symptoms occurred. Erythrocyte sedimentation rates decreased in half of the patients. Freeze-dried placental blood proved ineffective orally.

TWO SUCCESSFUL HIP NAILINGS IN ONE PATIENT AT AGES OF 93 AND 95 YEARS.
Van Demark, R. E. *South Dakota J. Med. & Pharm.* **7:** 431 (Dec.) 1954.

The course of two hip fractures in one patient, illustrates the value of hip nailing in the extremely aged. When this woman was 93 years old, pain was eliminated and she became ambulatory following reduction of an intertrochanteric fracture of the left hip and blind hip nailing. At the age of 95, hip nailing was carried out successfully for a similar fracture on the right side, but the patient did not again become ambulatory. Local anesthesia assists in reducing the pain of transportation to the operating room and manipulation of the fracture, the operative shock, and the postoperative morbidity due to pulmonary complications.

EFFECTS OF 9-α-FLUOROHYDROCORTISONE ACETATE ADMINISTERED TO PATIENTS WITH ASTHMATIC BRONCHITIS.
Wakai, C. S., and Prickman, L. E. *Proc. Staff Meet., Mayo Clin.* **29:** 663 (Dec. 22) 1954.

Four patients with asthmatic bronchitis were treated with fluorohydrocortisone acetate for eight to seventeen days with dosages ranging from 6 to 16 mg. daily in divided doses. Edema was noted in 3 patients, with gain in weight of 3½ to 7½ pounds during treatment with fluorohydrocortisone. Significant changes in blood pressure were not noted. The value for serum potassium dropped in 1 patient; that for serum sodium remained within the normal range. The effect on asthma was variable. One patient obtained no symptomatic benefit, another experienced subjective improvement, the third probably improved because of other measures, and the fourth responded satisfactorily. (From authors' summary.)

THE EFFECTS OF ALDOSTERONE (ELECTROCORTIN) AND OF 9-α-FLUOROHYDROCORTISONE ACETATE ON RHEUMATOID ARTHRITIS: PRELIMINARY REPORT.
Ward, L. E.; Polley, H. F.; Slocumb, C. H.; Hench, P. S.; Mason, H. L.; Mattox, V. R.. and Power, M. H. *Proc. Staff Meet., Mayo Clin.* **29:** 649 (Dec. 22) 1954.

Aldosterone administered intramuscularly for six days to each of 2 patients with rheumatoid arthritis neither improved the arthritis nor made it more severe. One patient received as much as 800, the other as much as 1,000, micrograms per day. Some retention of sodium, chloride and fluid was noted. There was no evidence that aldosterone significantly altered the metabolism of protein or carbohydrate. The excretion of urinary 17-ketosteroids and corticosteroids was unaffected. 9-α-Fluorohydrocortisone acetate, a synthetic halogenated steroid, lessened rheumatic symptoms in 3 patients who received oral doses up to 4, 6 and 8 mg. daily for twelve to twenty-eight days. The antirheumatic effectiveness of these comparatively small doses was accompanied by troublesome retention of sodium, chloride and fluid, and by loss of potassium. Protein and carbohydrate metabolism showed no significant changes. The urinary excretion of 17-ketosteroids was found to be significantly reduced, whereas that of corticosteroids remained essentially unaltered.

PEPTIC ESOPHAGITIS AND PEPTIC ULCER OF THE ESOPHAGUS.
Ware, G. W. *M. Ann. District Columbia* **23:** 616 (Nov.) 1954.

Peptic ulcer of the esophagus is a common condition. It is due to the continued presence of gastric juice in the lower esophagus. The cause of the presence of gastric juice may be an incompetent cardiac sphincter or aberrant islands of gastric tissue in the esophagus. The symptoms include pain, dysphagia and regurgitation of food. Males are more commonly affected. The diagnosis can be verified by esophagoscopy and barium x-ray examination. The complications are those of peptic ulcer elsewhere—pain, hemorrhage, perforation and obstruction. Surgery is indicated for the complications. Resection of the involved area is often necessary. Combined with an adequate resection of the stomach, such surgery gives good results. (Author's summary.)

1956 ANNUAL MEETING

AMERICAN GERIATRICS SOCIETY

Palmer House, Chicago, Illinois

May 3 and 4, 1956

All Fellows are urged to attend the annual meeting. Make plans early. The Palmer House in Chicago has set aside a number of rooms to take care of Fellows who plan to attend the meeting. Write to Mr. E. M. Langford, Reservation Manager, Palmer House, Chicago, Illinois. Mention that you will attend the annual meeting and Mr. Langford will be glad to take care of your needs.

Would you like to give a paper at the annual meeting? If so, please fill in the coupon below and mail promptly, with an abstract of your paper, about 200 words, to Norris J. Heckel, M.D., Chairman, Program Committee, 122 South Michigan Boulevard, Chicago, Illinois. Your abstract must be in Dr. Heckel's hands before January 1st, 1956.

NAME_____

ADDRESS_____

TITLE OF PAPER TO BE SUBMITTED_____

_____

EUROPEAN SYMPOSIUM ON VITAMIN B_{12}

Plans are being made for the first European Symposium on Vitamin B_{12} to be held the *last week of May 1956*, in Hamburg. It will be under the auspices of the physiological chemist Prof. Kühnau, and the internist Prof. Jores. The physiology and the clinical application of vitamin B_{12} in human and veterinary medicine will be discussed. For information write to Doz. Dr. H. Bauer, Nervenklinik, Hamburg-Eppendorf, Germany.

CONGRESO PANAMERICANO DE GERONTOLOGIA

The Primer Congreso Panamericano de Gerontologia will be held in Mexico, D.F. under the presidency of Dr. Manuel Payno, *September 7–15, 1956*. Dr. Payno is the President of the Academia Mexicana de Gerontologia and the Sociedad Mexicana de Geriatria. His address is Ave. Cuauhtemoc No. 10-3, Mexico 7, D.F. It is his ambition to have every nation in the hemisphere officially represented.

The location is well chosen. Like London, Paris and Rome, Mexico has a well deserved reputation for the success of international congresses. Under the most enjoyable and favorable conditions the way will be prepared for close and friendly cooperation.

The holding of this congress is approved by Dr. J. H. Sheldon, President of the International Association of Gerontology. He has agreed to serve as an honorary president. Since it is Pan American in scope it will fit in nicely between the 1954 Third International Gerontological Congress in London and the Fourth International Gerontological Congress at Merano, Italy, September 1–7, 1957 under the presidency of Professor E. Greppi.

The Comite Organizador has chosen and appointed a North American Committee of Cooperation as follows:

Dr. Walter C. Alvarez, Chicago
Dr. E. V. Cowdry, *Chairman*, St. Louis
Dr. Michael Dacso, New York
Mrs. J. N. Good, Toronto
Dr. Wm. B. Kountz, St. Louis
Dr. Albert I. Lansing, Atlanta
Miss Ollie A. Randall, New York
Dr. Hans Selye, Montreal
Dr. Nathan W. Shock, Baltimore
Dr. Malford Thewlis, Wakefield, R. I.

These desiring to present papers at the Congress should send abstracts of not more than 200 words to Dr. E. V. Cowdry, Washington University School of Medicine, St. Louis 10, Mo., *before April 1, 1956* and mention whether it is intended to show lantern slides.

THE TEXAS GERIATRICS SOCIETY ANNUAL MEETING

January 8, 1956 • Houston, Texas

Jesse Jones Library Building

PROGRAM

9:00– 9:20	Blood Diseases More Common in the Aged *Dr. Robert A. Hettig*
9:25– 9:45	The Hypertension in the Geriatric Patient *Dr. John Moyer*
9:50–10:10	Roentgenographic Findings in the Chest of Aged Patients *Dr. Lynn Doubleday*
10:15–10:35	Senescent Changes in the Stomach *Dr. Vincent Collins*
10:40–11:00	The Types and Treatment of Infections in Aged Patients *Dr. Ellard M. Yow*
11:05–11:10	RECESS
11:10–12:10	*Dr. G. N. Burch*—Guest
12:10– 2:00	LUNCH
2:00– 2:20	The General Treatment of the Geriatric Patient *Dr. Fred Dorsey*
2:25– 2:45	Rehabilitation of the Aged *Dr. John B. Mahney*
2:50– 3:10	Pulmonary Diseases in Geriatric Patients *Dr. Daniel E. Jenkins*
3:15– 3:35	Approach to the Sex Problems in the Aged *Dr. Lewis C. Mills*
3:40– 4:00	Nutritional Requirements of Aged People *Dr. Raymond Gregory*—Galveston, Texas
4:05– 4:25	Mental Problems in the Aged *Dr. William Lhaman*
4:30– 4:50	Senescence in Executives in Industry *Dr. Henry Cromwell*

* * * * *

No charge to members for attendance. Business meeting at noon for election of officers and choice of meeting place in 1957. It has been proposed that we have the meeting in Mexico City.

AUTHOR INDEX

ACKERMANN, P. G., *see* Kountz, W. B., 691
Aebersold, P. C. Progress against cancer with radioisotopes, 772
Alai, J., *see* Jamison, W. L., 521
Amato, L. L. The practice of geriatrics, 791
Atkinson, H. S. The psychologist and geriatric treatment concepts, 483
Atkinson, H. S., *see* Baker, J. L., 473

BACON, H. E., *see* Trimpi, H. D., 589
Baker, J. L., and Atkinson, H. S. The use of nicotinic alcohol in state hospital geriatric patients, 473
Bell, H. G., and Low-Beer, B. V. A. Cancer of the breast. A preliminary report on a new approach to the problem, 396
Berens, C., and Breakey, A. S. The importance of glaucoma with increasing age, 181
Billingslea, F. Y. Orientation in geriatric clinical psychology, 439
Birnberg, C. H., and Kurzrok, R. Low-dosage androgen-estrogen therapy in the older age group, 656
Blades, B., *see* Salzberg, A. M., 15
Blaustein, A. Clinical trials with a new antianemic agent—acidiron, 120
Boger, W. P. Evaluation of orally administered penicillin, 556
Bollinger, J. A., and Nabers, L. W. Acute small-bowel obstruction, 817
Breakey, A. S., *see* Berens, C., 181
Bressler, V. A., *see* Gleason, J. F., 552
Brick, I. B., *see* Palmer, E. D., 681
Brush, B. E., and Priest, R. J. The dilemma of gastric ulcer—benign or malignant? A plan of management for geriatric patients, 1027
Brush, B. E., *see* Priest, R. J., 55
Burton, C. R. Anticoagulant therapy in fresh infarction of the heart, 226
Bush, R. D., *see* Thompson, J. E., 248

CAMPBELL, D. C., Jr., and Langston, H. T. Intrathoracic surgical procedures in patients past the age of 60, 330
Canahuati, S. M., *see* Steigmann, F., 1015
Chandler, F. A., *see* Heck, C. V., 993
Chevalley, J., *see* McGavack, T. H., 96
Conwell, D. V., Kurth, C. J., and Murphy, P. G. Use of psychologic tests in determining prognosis and treatment in geriatric mental illnesses, 232
Coogan, T. J. Willard Owen Thompson: obituary, 623
Cooper, G. W. Cerebral arteriosclerosis and the so-called presenile scleroses, 488
Cooper, I. S., and Poloukhine, N. Chemopallidectomy: A neurosurgical technique useful in geriatric parkinsonians, 839

DAVIS, E. W., *see* Peabody, J. W., Sr., 566
DeVera, L., *see* Jamison, W. L., 521
Dittrich, R. J. Disability of the knee due to referred pain and related phenomena, 800

EIBER, H. B., *see* Goldbloom, A. A., 367
Eik-Nes, K., *see* Tyler, F. H., 79
Elman, R. Surgical experience in the aged as an aid to surgery in the young, 85

FITZELLE, G. T. Basic needs of a selected group of widows as revealed through projective questions, 902
Fitzelle, G. T. Strength of opinion as an indication of philosophy of life; the relationship between strength of opinion and adjustment, 306
Fitzpatrick, W. F., *see* Hollister, L., 197
Florentin, A. A., *see* Tyler, F. H., 79
Freis, E. D. Treatment of the elderly hypertensive patient, 710
Freis, E. D., *see* Henderson, E., 877
Fricke, R. E. Late recurrences of pelvic cancer, with description of an unusual case, 534
Friedman, A. P. Headache: Diagnosis and treatment, 399

GERTLER, M. M., *see* Henderson, E., 877
Ginzberg, R. Attitude therapy in geriatric ward psychiatry, 445
Ginzberg, R. Orientation in geriatric psychiatry, 435

Ginzberg, R. Sleep and sleep disturbance in geriatric psychiatry, 493
Gleason, J. F., Jonas, K. C., and Bressler, V. A. The use of the right colon as a substitute gastric pouch after total gastrectomy, 552
Glenn, F., *see* Hays, D. M., 21
Glenn, F., *see* Karl, R. C., 667
Glenn, F., *see* Wantz, G., 974
Godellas, V., *see* Steigmann, F., 1015
Goldbloom, A. A., and Eiber, H. B. Newer clinical and laboratory studies in the aged. VI. Serum lipids, lipoproteins and atherogenic index in "normal" subjects 80–100 years of age, 367
Goldstein, N., *see* Heaver, L., 687
Goodbody, M. F., Jr., *see* Hilton, J. G., 697
Graham, J. B., and Graham, R. M. The sensitization response (SR) in cancer of the uterine cervix, 863
Graham, R. M., *see* Graham, J. B., 863
Gray, J. W., and Merrick, E. Z. The clinical evaluation of Meticorten in rheumatoid arthritis and allied conditions, 337
Gregory, L. J., *see* Priest, R. J., 55

HAAR, H., *see* McGavack, T. H., 754
Happey, F., *see* Naylor, A., 964
Hayes, M. A. Biliary-tract surgery in patients past 60 years of age, 146
Hays, D. M., and Glenn, F. The fate of the cholecystostomy patient, 21
Heaver, L., White, W., and Goldstein, N. Clinical experience in restoring oral communication to 274 laryngectomized patients by esophageal voice, 687
Heck, C. V. Management of hip fracture in the geriatric patient, 113
Heck, C. V., and Chandler, F. A. Diagnosis and treatment of pain in the acromioclavicular joint, 993
Henderson, E. (Chairman) Panel discussion on heart disease, 877
Henderson, E. Foreword (to issue of Journal, July, devoted to psychiatric problems of older people), 433
Heppner, G. J. X-ray findings in geriatric surveys, 704
Hilton, J. G., Goodbody, M. F., Jr., and Kruesi, O. R. The effect of prolonged administration of aluminum chloride on the blood acid-base equilibrium of geriatric subjects, 697
Himler, L. E., and Morrisey, V. Factors influencing prognosis in psychiatric illness of the aged, 811
Hollister, L., and Fitzpatrick, W. F. Oral Metrazol in the psychoses associated with old age, 197
Hotchkiss, R. S. Prostatic obstruction in the aged, 1005
Hunnicutt, A. J. Physiologic reserves in the aged: Application to operability, 93
Hunnicutt, A. J., *see* Thomas, E. G., 311
Hunter, O. B. Julian M. Howe: obituary, 626

JAEGER, R., The relief of tic douloureux (trigeminal tic) and other pains of the fifth cranial nerve by injection of hot water into the gasserian ganglion, 416
Jaffe, H. L., *see* Henderson, E., 877
Jaffe, H. L., *see* Master, A. M., 299
Jamison, W. L., DeVera, L., Katakis, G., Alai, J., and Nichols, H. T. Studies on coronary blood flow, with emphasis on the treatment of coronary insufficiency, 521
Johnstone, R. T. The importance of geriatrics in industrial medicine, 117
Jonas, K. C., *see* Gleason, J. F., 552
Jordan, S. M. Reginald Fitz: obituary, 627

KAPLAN, J. The integration of social service activities and the post-hospital adjustment of the aging, 467
Kapp, D. F., *see* Shallenberger, P. L., 922
Karl, R. C., and Glenn, F. Preparation of the geriatric patient undergoing surgery of the biliary tract, 667
Katakis, G., *see* Jamison, W. L., 521
Katz, S., *see* Peabody, J. W., Sr., 566
Kaufman, W. The use of vitamin therapy to reverse certain concomitants of aging, 927
Kelly, G. L. Problems of impotence in aging males, 883
Kheim, T., *see* Kountz, W. B., 691
Kinsell, L. W. Emergency and prophylactic corticoid therapy in individuals past 50, 285
Kinsell, L. W. Hormones, growth and senescence, 31
Konzelmann, F. N. Sodium metabolism; normal and abnormal, 540
Kountz, W. B., Ackermann, P. G., and

Kheim, T. The effect of added carbohydrate and fat on the nitrogen balance in the elderly, 691
Kruesi, O. R., *see* Hilton, J. G., 697
Kurth, C. J., *see* Conwell, D. V., 232
Kurtz, P. Diagnostic screening procedures for the office, 796
Kurzrok, R., *see* Birnberg, C. H., 656

LABECKI, T. D. The saga of lipotropic therapy, 527
Langston, H. T., *see* Campbell, D. C., Jr., 330
Ledbetter, P. V., and Morrow, E. J. Thirty-three years' experience in the management of arterial hypertension, 172
Ledwich, T. W., *see* Thomas, E. G., 311
Lehr, D. Problems of chemotherapy in the older age group, 355
Lehr, D., *see* Henderson, E., 877
Lillo, H., *see* Soto-Hall, R., 106
Low-Beer, B. V. A., *see* Bell, H. G., 396

MACRAE, T., *see* Naylor, A., 964
Maluf, N. S. R., and Spurr, C. L. Effect of cortisone on reactivated metastatic carcinoma of the prostate, 745
Master, A. M., and Jaffe, H. L. Physiologic effects of obesity upon the heart. The incidence of obesity in coronary disease, 299
Masters, W. H. Rationale of sex steroid replacement in the "neutral gender," 389
Matthews, R. A., and Stevenson, I. Recovery from dementing psychoses of old age, 720
McCartney, J. L. Electroshock treatment in involutional and senile psychoses, 50
McGavack, T. H. The male climacterium, 639
McGavack, T. H., Chevalley, J., and Pearson, S. Variations in the response of individuals of different ages to an antithyroid compound (methimazole), 96
McGavack, T. H., Pearson, S., and Haar, H. Steroid studies. III. The influence of anabolic steroids on the chromatographic patterns of 17-ketosteroid excretion by hypogonadal and aged men, 754
Merrick, E. Z., *see* Gray, J. W., 337
Merrill, G. G. Prevention of emotional disorders in later life, 860
Miller, R. M., *see* Tenney, S. M., 937
Moore, M. T. Diagnosis and treatment of subdural hemorrhage in the very aged, 984
Morgan, Z. R. A newer method of nicotinic acid therapy in headache of the vasoconstrictive type, 545
Moriyama, I. M. Mortality in the United States and in other countries of low mortality, 893
Morris, J. McL. Gynecologic carcinoma in the older patient, 259
Morrisey, V., *see* Himler, L. E., 811
Morrow, E. J., *see* Ledbetter, P. V., 172
Motley, H. L., and Smart, R. H. Pulmonary emphysema: Physiologic factors in diagnosis and advances in therapy, 316
Muehlenbein, J. M. Patient-family relationships, 479
Murphy, P. G., *see* Conwell, D. V., 232

NABERS, L. W., *see* Bollinger, J. A., 817
Naylor, A., Happey, F., and MacRae, T. Changes in the human intervertebral disc with age: A biophysical study, 964
Nichols, H. T., *see* Jamison, W. L., 521

PAGE, J. A. Fatal suppression of symptoms during hormone therapy, 890
Palmer, E. D., and Brick, I. B. Esophageal varices: Causes other than cirrhosis and portal-vein block, 681
Peabody, J. W., Jr., *see* Peabody, J. W., Sr., 566
Peabody, J. W., Sr., Katz, S., Davis, E. W., and Peabody, J. W., Jr. Current concepts in the management of pulmonary tuberculosis, 566
Pearson, S., *see* McGavack, T. H., 96, 754
Perlstein, I. B. Histamine as a stress-combating agent in the treatment of rheumatic disease, 997
Phillips, K. Ultrasound waves in therapeutics: A review of the present status, 596
Poloukhine, N., *see* Cooper, I. S., 839
Pottenger, F. M. The correlation of physical and emotional aspects of disease, 537
Pratt, G. H. Sympathectomy for occlusive arterial disease, 580
Priest, R. J., Brush, B. E., and Gregory, L. J. Medical and surgical management of diverticulitis in geriatric patients, 55
Priest, R. J., *see* Brush, B. E., 1027

RAPP, V. W. Physical medicine and rehabilitation on a geriatric ward, 463
Rawls, W. B. A five-year study of adrenal steroid compounds, 614
Reese, H. H. Comments on the history of geriatrics, 443
Rogers, F. B. Unsuspected cardiac infarction with cerebrovascular accidents, 714
Russek, H. I., *see* Henderson, E., 877

SALZBERG, A. M., and Blades, B. Surgical management of emphysematous blebs and bullae, 15
Samuels, L. T., *see* Tyler, F. H., 79
Sandberg, A. A., *see* Tyler, F. H., 79
Schauffler, G. C. Significance and management of genital prolapse in the aged, 43
Schott, J. Treatment of primary hypertension in the older age group, 910
Scott, R. M. Multiple myeloma, 725
Sewell, W., *see* Van Winkle, W., Jr., 572
Shallenberger, P. L., and Kapp, D. F. Necessity of proctosigmoidoscopy in recognition of anorectal disease: A controlled study, 922
Shepard, W. P. Does the modern pace really kill?, 139
Smart, R. H., *see* Motley, H. L., 316
Smith, T. L. The changing number and distribution of the aged population, 1
Smithwick, R. H., *see* Thompson, J. E., 248
Solez, C. Premature vascular degeneration in diabetes mellitus: Pathogenesis, and relation to aging, 804
Soto-Hall, R., and Lillo, H. New trends in the treatment of fracture of the hip in the aged, 106
Spurr, C. L., *see* Maluf, N. S. R., 745
Stare, F. J. Nutrition and aging, 767
Starr, P. Thyroxine therapy in preventive geriatrics, 217
Stearns, M. W., Jr. Palliative surgery in cancer of the rectum and colon, 731
Steigmann, F., Godellas, V., and Canahuati, S. M. Jaundice in the aged: Diagnostic and therapeutic implications, 1015
Stevenson, I., *see* Matthews, R. A., 720

TENNEY, S. M., and Miller, R. M. Respiratory response in the aged, 937
Thomas, E. G., Ledwich, T. W., and Hunnicutt, A. J. The fluid, electrolyte and nutritional management of the elderly surgical patient, 311
Thompson, J. E., Bush, R. D., Whitelaw, G. P., and Smithwick, R. H. The surgical treatment of human hypertension, 248
Trimpi, H. D., and Bacon, H. E. Successful nonsurgical reperitonization of the pelvic floor following radical excision for cancer of the rectum, 589
Tyler, F. H., Eik-Nes, K., Sandberg, A. A., Florentin, A. A., and Samuels, L. T. Adrenocortical capacity and the metabolism of cortisol in elderly patients, 79

VAN WINKLE, W., Jr., Sewell, W., and Wiland, J. Mechanism of absorption and antigenicity of absorbable collagen sutures, 572
Vest, W. E. Robert Johnson Wilkinson: obituary, 625

WALKER, W. J. Should the patient with a healed myocardial infarction avoid physical exertion?, 959
Wantz, G., and Glenn, F. The treatment of intestinal obstruction in the aged, 974
White, W., *see* Heaver, L., 687
Whitelaw, G. P., *see* Thompson, J. E., 248
Whitney, B. V. Retrorectal hemangioendothelioma, 867
Wiland, J., *see* Van Winkle, W., Jr., 572
Wilkinson, C. F., Jr. Effects of lipotropes and sitosterol on the level of blood lipids and the clinical course of angina pectoris, 381
Wilkinson, C. F., Jr., *see* Henderson, E., 877
Wilson, D. C. The influence of emotional attitudes on the aging process, 292
Wittich, F. W. Respiratory allergies and their modifications in patients over 45 years of age, 239
Wolffe, J. B. Atheromatous and essential benign hypertension—two clinical entities: Differential diagnosis and treatment, 607

ZIFFREN, S. E. Management of the burned elderly patient, 36

SUBJECT INDEX

ABSTRACTS of current literature, 64, 125, 201, 270, 345, 424, 512, 628, 735, 823, 945, 1034

Acidiron: *see* Blood

Acromio-clavicular joint: *see* Bones and joints

Adjustment: *see* Psychological

Adrenal: *see also* Hormones; Steroids
- — corticoid therapy in individuals past 50; emergency and prophylactic, 285
- — cortisol; adrenocortical capacity and metabolism of, in elderly patients, 79
- — cortisone, effect of, on reactivated metastatic carcinoma of prostate, 745
- — hormones, growth and senescence, 31
- — hormone therapy; fatal suppression of symptoms during, 890
- — Meticorten in rheumatoid arthritis and allied conditions; clinical evaluation of, 337
- — steroid compounds; 5-year study of, 614

Adrenocortical: *see* Adrenal

Adrenocorticotropic hormone (ACTH): *see* Adrenal

Advertisers, index to (each issue, July–December)

Age: *see also* Geriatrics; Senile; and under various systems and diseases
- — aged men, hypogonadal and; influence of anabolic steroids on chromatographic patterns of 17-ketosteroid excretion by, 754
- — aging males; problems of impotence in, 883
- — aging; nutrition and, 767
- — aging; premature vascular degeneration in diabetes mellitus; pathogenesis, and relation to, 804
- — aging; use of vitamin therapy to reverse certain concomitants of, 927
- — climacteric: *see* Climacteric
- — different ages; variations in response of individuals of, to antithyroid compound (methimazole), 96
- — elderly patient, management of the burned, 36
- — elderly patients; adrenocortical capacity and metabolism of cortisol in, 79
- — geriatric: *see* Geriatrics
- — individuals past 50; emergency and prophylactic corticoid therapy in, 285
- — later life; prevention of emotional disorders in, 860
- — old age; oral Metrazol in psychoses associated with, 197
- — old age; recovery from dementing psychoses of, 720
- — patients over 45 years of age; respiratory allergies and their modifications in, 239
- — patients past age of 60; intrathoracic surgical procedures in, 330
- — patients past 60 years of age; biliary-tract surgery in, 146
- — senescence, hormones, and growth, 31
- — senility: *see also* Senile
- — the aged; factors influencing prognosis in psychiatric illness of, 811
- — the aged; fracture of hip in; new trends in treatment of, 106
- — the aged; genital prolapse in; significance and management of, 43
- — the aged; jaundice in; diagnostic and therapeutic implications, 1015
- — the aged; newer clinical and laboratory studies in; serum lipids, lipoproteins and atherogenic index in "normal" subjects 80–100 years of age, 367
- — the aged; physiologic reserves in; application to operability, 93
- — the aged population; changing number and distribution, 1
- — the aged; prostatic obstruction in, 1005
- — the aged; respiratory response in, 937
- — the aged; surgical experience in; as aid to surgery in young, 85
- — the aged; treatment of intestinal obstruction in, 974
- — the aging; integration of social service activities and post-hospital adjustment of, 467
- — the aging process; influence of emotional attitudes on, 292
- — the elderly; effect of added carbohydrate and fat on nitrogen balance in, 691
- — the elderly hypertensive patient; treatment of, 710
- — the elderly surgical patient; fluid,

Age—*Continued*
electrolyte and nutritional management of, 311
— the "neutral gender"; rationale of sex steroid replacement in, 389
— the older age group; low-dosage androgen-estrogen therapy in, 656
— the older age group; problems of chemotherapy, 355
— the older age group; treatment of primary hypertension in, 910
— the older patient; gynecologic carcinoma in, 259
— the very aged; diagnosis and treatment of subdural hemorrhage in, 984
— with age; changes in human intervertebral disc: biophysical study, 964
— with increasing age; glaucoma, importance of, 181
Aging: *see* Age; Geriatrics; Senescence; Senile
Alcohol, nicotinic; use of, in state hospital geriatric patients, 473
Allergies: *see* Lungs and bronchi
Aluminum chloride; effect of prolonged administration of, on blood acid-base equilibrium of geriatric subjects, 697
American College of Physicians; postgraduate course in stress and aging (Philadelphia); announcement of, 215, 282
American Geriatrics Society
— Annual meeting (1955), New York
— announcements of, 72, 133, 210, 277
— program of, 73, 133, 210, 277
— Annual meeting (1956), Chicago
— announcements of, 432, 519, 635, 742, 837
— Fellowship (membership) in: *see* Contents page, front ad. section
— Graduate symposium on geriatric medicine (1955), New York
— announcements of, 636, 741, 832
— program of, 833
— Journal of: *see* Journal of the American Geriatrics Society
— Officers
— *1954–55*: *see* A. G. S. general information page, front ad section (Jan.–June)
— *1955–56: see Ibid.* (July–Dec.)
American Medical Writers' Association; announcement of 1955 meeting (St. Louis), 352
American Society for the Study of Arteriosclerosis; Ninth Annual Meeting of (1955), Chicago; announcement of, 744
American Therapeutic Society 56th Annual Meeting (1955) at Atlantic City, N. J.; announcement of, 354
Ammonium chloride; effect of prolonged administration of, on blood acid-base equilibrium of geriatric subjects, 697
Anabolic steroids: *see* Steroids
Androgens: *see* Hormones; Steroids
Anemia: *see* Blood
Angina pectoris: *see* Heart
Anorectal: *see* Gastro-intestinal tract
Antianemic: *see* Blood
Antibiotics: *see* under specific drug
Anticoagulant: *see also* Heart
— therapy in fresh infarction of heart, 226
Antithyroid compound (methimazole): *see* Thyroid
Arterial: *see* Vascular system
Arteriosclerosis: *see* Vascular system
Arthritis: *see also* Bones and joints
— rheumatoid arthritis and allied conditions; clinical evaluation of Meticorten in, 337
Atherogenic index: *see* Vascular system
Atheromatous hypertension: *see* Vascular system
Atherosclerosis: *see* Vascular system
Attitude therapy in geriatric ward psychiatry, 445
Author index to Volume III, 1043

BASIC needs of selected group of widows as revealed through projective questions, 902
Biliary tract: *see* Gallbladder
Biochemical studies: *see* Blood
Biophysical study; changes in human intervertebral disc with age, 964
Bladder: *see* Gallbladder; Liver
Blebs: *see* Lungs and bronchi
Blood: *see also* Vascular system; Heart; and under specific element or disease involved
— acidiron; new antianemic agent; clinical trials with, 120
— blood acid-base equilibrium of geriatric subjects; effect of prolonged administration of ammonium chloride on, 697
— lipotropes and sitosterol; effects of, on level of blood lipids and clinical course of angina pectoris, 381
— serum lipids, lipoproteins and atherogenic index in "normal" subjects 80–100 years of age, 367

Blood pressure: *see* Vascular system
Bones and joints: *see also* Arthritis
— acromio-clavicular joint; diagnosis and treatment of pain in, 993
— fracture of hip in the aged; new trends in treatment of, 106
— hip fracture in the geriatric patient; management of, 113
— intervertebral disc, human; changes in, biophysical study, 964
— knee, disability of, due to referred pain and related phenomena, 800
— myeloma, multiple, 725
— rheumatic disease; histamine as stress-combating agent in treatment of, 997
Books received, 830
Brain: *see also* Mental; Nervous System; Psychoses; Psychiatric; Psychological
— cerebral arteriosclerosis and so-called presenile scleroses, 488
— chemopallidectomy: neurosurgical technique useful in geriatric parkinsonians, 839
— subdural hemorrhage in the very aged; diagnosis and treatment of, 984
Breast; cancer of, 396
Bronchi: *see* Lungs
Bullae: *see* Lungs and bronchi
Bulletin on Rheumatic Diseases; bound copy of; available to physicians, 77
Burned elderly patient; management of, 36

CANCER
— carcinoma of prostate, reactivated metastatic; effect of cortisone on, 745
— gastric ulcer—benign or malignant; dilemma of, 1027
— gynecologic carcinoma in older patient, 259
— myeloma, multiple, 725
— of breast, 396
— of rectum and colon; palliative surgery in, 731
— of rectum; successful nonsurgical re-peritonization of pelvic floor following radical excision for, 589
— of uterine cervix; sensitization response (SR) in, 863
— pelvic cancer, late recurrences of; with description of unusual case, 534
— progress against, with radioisotopes, 772
— prostatic obstruction in the aged, 1005
— retrorectal hemangioendothelioma, 867
— right colon; use of, as substitute gastric pouch after total gastrectomy, 552
Carbohydrate: *see* Nutrition
Carcinoma: *see* Cancer
Cardiac: *see* Heart
Cardiovascular: *see* Heart; Vascular system
Cerebral arteriosclerosis: *see* Brain
Cerebrovascular: *see* Vascular system
Cervix: *see* Uterus and cervix
Changing number and distribution of the aged population, 1
Chemopallidectomy: a neurosurgical technique useful in geriatric parkinsonians, 839
Chemotherapy; problems of, in older age group, 355
Chest: *see* Lungs and bronchi
Chloride: *see* Aluminum
Cholecystitis: *see* Gallbladder; Liver
Cholecystostomy: *see* Gallbladder
Chromatographic: *see* Steroids
Circulation: *see* Heart; Vascular system
Cirrhosis: *see* Liver
Climacteric: *see also* Testis
— climacterium, male, 639
— low-dosage androgen-estrogen therapy in older age group, 656
Collagen sutures: *see* Surgery
Colon: *see* Gastro-intestinal tract
Congreso Panamericano de Gerontologia (1956), Mexico; announcement of, 1041
Contents of Volume III, i
Coronary: *see* Vascular System; Heart
Corticoid therapy: *see* Adrenal
Cortisol: *see* Adrenal
Cortisone: *see* Adrenal
Cranial: *see* Nervous system
Current literature; abstracts of, 64, 125, 201, 270, 345, 424, 512, 628, 735, 823, 945, 1034

DEMENTING: *see* Psychoses
Diabetes mellitus; premature vascular degeneration in; pathogenesis, and relation to aging, 804
Diagnostic: *see also* under specific condition
— radioisotopes; progress against cancer with, 796
— screening procedures for office, 796
— X-ray findings in geriatric surveys, 704
Digestive tract: *see* Gastro-intestinal tract
Disc: *see* Bones and joints
Disease: *see also* specific disease

Disease—*Continued*
— correlation of physical and emotional aspects of, 537
— heart; panel discussion on, 877
Diverticulitis: *see* Gastro-intestinal tract
Does modern pace really kill?, 139
Drugs: *see also* under specific drug or disease
— chemotherapy; problems of, in older age group, 355

EDITORS and Editorial Board: *see* Journal of American Geriatrics Society
Elderly persons: *see* Age
Electrolyte: *see* Nutrition
Electroshock treatment; in involutional and senile psychoses, 50
Emotional: *see* Psychiatric; Psychological; Mental; Nervous System
Emphysema: *see* Lungs and bronchi
Endocrine: *see* Hormones; Steroids; and under specific endocrine glands
Endometrium: *see* Uterus and cervix
Errata, 637, 952
Esophageal
— esophageal varices; causes other than cirrhosis and portal-vein block, 681
— esophageal voice; clinical experience in restoring oral communication to 274 laryngectomized patients by, 687
Estrogens: *see* Hormones; Steroids
European Symposium on Vitamin B_{12} (1956), Hamburg; announcement of, 1041
Eye
— glaucoma; importance of, with increasing age, 181

FAT: *see* Metabolism
Fitz, Reginald; obituary, 627
Foods: *see* Nutrition
Fractures: *see* Bones and joints

GALLBLADDER: *see also* Liver
— biliary tract; preparation of geriatric patient undergoing surgery of, 667
— biliary-tract surgery in patients past 60 years of age, 146
— cholecystostomy patient; fate of, 21
Ganglion: *see* Nervous system
Gasserian: *see* Nervous system
Gastrectomy: *see* Surgery
Gastric: *see* Gastro-intestinal tract
Gastro-intestinal tract
— acidiron; new antianemic agent; clinical trials with, 120
— anorectal disease; necessity of proctosigmoidoscopy in recognition of; controlled study, 922
— biliary tract; preparation of geriatric patient undergoing surgery of, 667
— biliary-tract surgery in patients past 60 years of age, 146
— cancer of rectum; successful nonsurgical reperitonization of pelvic floor following radical excision for, 589
— diverticulitis in geriatric patients; medical and surgical management of, 55
— esophageal varices: causes other than cirrhosis and portal-vein block, 681
— gastric ulcer—benign or malignant; dilemma of, 1027
— intestinal obstruction in aged; treatment of, 974
— rectum and colon; palliative surgery in cancer of, 731
— right colon: use of, as substitute gastric pouch after total gastrectomy, 552
— small-bowel obstruction, acute, 817
Genital prolapse in the aged; significance and management of, 43
Geriatrics: *see also* Age; Senile
— American Geriatrics Society: *see* American Geriatrics Society
— does modern pace really kill?, 139
— geriatric clinical psychology; orientation in, 439
— geriatric literature abstracts, 64, 125, 201, 270, 345, 424, 512, 628, 735, 823, 945, 1034
— geriatric medicine; symposium on; *see* American Geriatrics Society
— geriatric mental illnesses; use of psychologic tests in determining prognosis and treatment in, 232
— geriatric parkinsonians; chemopallidectomy, neurosurgical technique useful in, 839
— geriatric patient; hip fracture in; management of, 113
— geriatric patients; diverticulitis in; medical and surgical treatment of, 55
— geriatric patients, plan of management for; dilemma of gastric ulcer—benign or malignant, 1027
— geriatric patients, state hospital; use of nicotinic alcohol in, 473

— geriatric patient undergoing surgery of biliary tract; preparation of, 667
— geriatric psychiatry; orientation in, 435
— geriatric psychiatry; sleep and sleep disturbance in, 493
— geriatrics; comments on history of, 443
— geriatrics; importance of, in industrial medicine, 117
— geriatrics, preventive; thyroxine therapy in, 217
— geriatrics; the practice of, 791
— geriatric subjects; effect of prolonged administration of ammonium chloride on blood acid-base equilibrium of, 697
— geriatric surveys; X-ray findings in, 704
— geriatric treatment concepts; the psychologist and, 483
— geriatric ward; physical medicine and rehabilitation on, 463
— geriatric ward psychiatry; attitude therapy in, 445
— patient-family relationships, 479
Gerontology: *see* Geriatrics
Glaucoma: *see* Eye
Graduate Symposium on Geriatric Medicine: announcements of, 636, 741
Growth; hormones and senescence, 31
Gynecology: *see also* Estrogens; Uterus and cervix; Psychology
— genital prolapse in the aged; significance and management of, 43
— gynecologic carcinoma in the older patient, 259

HEADACHE: *see also* Brain; Nervous system; Psychological
— diagnosis and treatment, 399
— vasoconstrictive type; newer method of nicotinic acid therapy in, 545
Head injuries: *see* Brain
Heart: *see also* Vascular system
— angina pectoris; effects of lipotropes and sitosterol in level of blood lipids and clinical course of, 381
— cardiac infarction, unsuspected; with cerebrovascular accidents, 714
— coronary blood flow; studies on, with emphasis on treatment of coronary insufficiency, 521
— disease; panel discussion on, 877
— fresh infarction of; anticoagulant therapy in, 226
— infarction, healed myocardial; should patient with avoid physical exertion?, 959
— obesity; physiologic effects on heart; incidence of in coronary disease, 299
Hebrew Medical Journal commemorates the 750th anniversary of Maimonides' death, 353
Hemangioendothelioma: *see* Cancer
Hemorrhage: *see* Vascular system; Blood; and under specific disease
Hip: *see* Bones and joints
Histamine as stress-combating agent in treatment of rheumatic disease, 997
History of geriatrics; comments on, 443
Home for the Jewish Aged; First Annual Medical Symposium (1955), Philadelphia; announcement of, 743
Hormones: *see also* Endocrine; Steroids; and under various endocrine glands
— androgen-estrogen therapy, low-dosage; in older age group, 656
— fatal suppression of symptoms during therapy, 890
— growth and senescence, 31
— male climacterium, 639
Howe, Julian M.; obituary, 626
Hydrocortisone: *see* Adrenal
Hypertension: *see* Vascular system
Hyperthyroidism: *see* Thyroid
Hypogonadal: *see* Testis
Hypothyroidism: *see* Thyroid

IMPOTENCE: *see* Testis
Index, author, to Volume III, 1043
Index, subject, to Volume II[illegible] 1047
Index, to advertisers (in each issue, July–December)
Industrial medicine
— does modern pace really kill?, 139
— importance of geriatrics in, 117
Infarction: *see* Heart
Insomnia: *see* Sleep
Instructions to authors: *see* A. G. S. general information page, front ad. section
Intervertebral disc: *see* Bones and joints
Intestinal: *see* Gastro-intestinal tract
Intrathoracic surgical procedures in patients past age of 60, 330
Involutional and senile psychoses; electroshock treatment in, 50
Irradiation: *see* Radiotherapy
Isotopes: *see* Radiotherapy

JAUNDICE: *see* Liver
Joints: *see* Bones and joints
Journal of the American Geriatrics Society
— Contents of Volume III, i
— Editors & Editorial Board: *see* editorial page, front ad. section
— Indexes to Volume III
— author, 1043
— subject, 1047
— instructions to authors: *see* A. G. S. general information, front ad. section
— issue of the Journal (July) devoted to psychiatric problems of older people; Foreword and background data of authors, 433
— subscription data: *see* Contents page & information page, front ad. section

KETOSTEROIDS: *see* Steroids
Knee: *see* Bones and joints

LARYNGECTOMIZED patients; clinical experience in restoring oral communication to 274, by esophageal voice, 678
Later life: *see* Age
Lipids
— blood lipids; effects of lipotropes and sitosterol on level of, and clinical course of angina pectoris, 381
— lipotropic therapy, saga of, 527
— serum lipids, lipoproteins, and atherogenic index in "normal" subjects 80–100 years of age, 367
Lipoproteins: *see* Lipids
Lipotropes: *see* Lipids
Liver: *see also* Gallbladder
— alcoholic cirrhosis of; lipotropic therapy in, 527
— cirrhosis and portal-vein block, causes other than: esophageal varices, 681
— jaundice in the aged; diagnostic and therapeutic implications, 1015
Lungs and bronchi
— emphysematous blebs and bullae, surgical management of, 15
— pulmonary emphysema; physiologic factors in diagnosis and advances in therapy, 316
— pulmonary tuberculosis, current concepts in management of, 566
— respiratory allergies and their modifications in patients over 45 years of age, 239
— respiratory response in the aged, 937

MAIMONIDES: *see* Hebrew Medical Journal
Male: *see* Testis; Climacteric; Steroids
Malignant: *see* Cancer
Medical Library Association; 1955 annual meeting, 352
Menopause: *see* Climacteric; Psychological
Mental: *see also* Brain; Psychoses; Psychiatric; Psychological
— emotional attitudes; influence of, on aging process, 292
— geriatric mental illnesses; use of psychologic tests in determining prognosis and treatment in, 232
— headache; diagnosis and treatment, 399
Metabolism: *see* Nutrition; Adrenal
Metastatic: *see* Cancer
Methimazole: *see* Thyroid
Meticorten: *see* Adrenal
Metrazol: *see* Psychoses
Michigan State Medical Society and the University of Michigan; announcement of course for physicians, "Gerontology", 78
Michigan, Univ. of; 8th annual conference on aging (1955), 283
Migraine: *see* Headache
Mortality in the United States and in other countries of low mortality, 893
Myeloma: *see* Cancer
Myocardial: *see* Heart

NEOPLASMS: *see* Cancer; Tumors
Nervous system: *see also* Brain; Mental
— chemopallidectomy: neurosurgical technique useful in geriatric parkinsonians, 839
— physical and emotional aspects of disease; correlation of, 537
— sympathectomy for occlusive arterial disease, 580
— tic douloureux (trigeminal tic) and other pains of 5th cranial nerve; relief of, by injection of hot water into gasserian ganglion, 416
Neurosurgical: *see* Surgical; Brain; Nervous system
"Neutral gender": *see* Steroids
Nicotinic
— acid therapy; newer method of, in headache of vasoconstrictive type, 545
— alcohol; use of, in state hospital geriatric patients, 473

Nitrogen balance in elderly; effect of added carbohydrate and fat on, 691
Norepinephrine; coronary blood flow, studies on; with emphasis on treatment of coronary insufficiency, 521
Nutrition: *see also* Obesity
— added carbohydrate and fat; effect of, on nitrogen balance in elderly, 691
— and aging, 767
— fluid, electrolyte and nutritional management of elderly surgical patient, 311
— sodium metabolism; normal and abnormal, 540
— vitamin therapy; to reverse certain concomitants of aging; use of, 927

OBESITY: *see also* Nutrition
— physiologic effects upon heart; incidence in coronary disease, 299
Obituaries
— Fitz, Reginald, 627
— Howe, Julian M., 626
— Thompson, Willard Owen, 623
— Wilkinson, Robert Johnson, 625
Obstruction: *see* under specific system
Officers of A. G. S.: *see* American Geriatrics Society
Old persons: *see* Age; Geriatrics; Senile
Operability: *see* Surgery
Oral communication, clinical experience in restoring; to 274 laryngectomized patients by esophageal voice, 687
Orientation
— in geriatric clinical psychology, 439
— in geriatric psychiatry, 435
Orthopedics: *see* Bones and joints; Surgery
Ovary: *see* Uterus and cervix

P^{32}; cancer of the breast, 396
Pace, modern: *see* Psychological
Panamerican Congress of Gerontology, 1041
Panel discussion on heart disease, 877
Parkinson's disease: *see* Nervous system; Brain
Patient-family relationships, 483
Pelvic cancer: *see* Cancer
Pelvic floor, successful nonsurgical reperitonization of; following radical excision for cancer of rectum, 589
Penicillin, orally; evaluation of, 556
Peritoneum: *see* Reperitonization
Philosophy of life: *see* Psychology
Physical exertion after infarct?, 959
Physical medicine and rehabilitation on geriatric ward, 463
Physiologic: *see also* under specific system or disease
— effects of obesity upon heart; incidence of obesity in coronary disease, 299
— reserves in aged; application to operability, 93
Pituitary: *see* Hormones; Adrenal
Population; changing number and distribution of aged, 1
Portal vein: *see* Vascular system
Presenile scleroses: *see* Brain
Proctosigmoidoscopy: *see* Gastro-intestinal tract
Prognosis: *see* under specific disease
Prolapse, genital; significance and management of in aged, 43
Prostate
— prostatic obstruction in the aged, 1005
— reactivated metastatic carcinoma of; effect of cortisone on, 745
Psychiatric: *see also* Brain; Mental; Psychological; Psychoses
— geriatrics; comments on history of, 443
— illness of aged; factors influencing prognosis in, 811
— issue (July) of Journal devoted to psychiatric problems of older people; Foreword, 433
— nicotinic alcohol; use of, in state hospital geriatric patients, 473
— orientation in geriatric psychiatry, 435
— patient-family relationships, 479
— psychiatry, geriatric; sleep and sleep disturbance in, 493
— psychiatry, geriatric ward; attitude therapy in, 445
— social service activities; integration of, and post-hospital adjustment of aging, 467
Psychological: *see also* Mental; Psychiatric; Nervous system; Psychoses
— does modern pace really kill?, 139
— emotional attitudes; influence of, on aging process, 292
— emotional disorders in later life; prevention of, 860
— physical and emotional aspects of disease; correlation of, 537
— psychologist and geriatric treatment concepts, 483

Psychological—*Continued*
— psychology, geriatric clinical; orientation in, 439
— strength of opinion as indication of philosophy of life; relationship between strength of opinion and adjustment, 306
— tests; use of, in determining prognosis and treatment in geriatric mental illnesses, 232
— widows, basic needs of selected group of; as revealed through projective questions, 902
Psychoses: *see also* Brain; Mental; Psychiatric; Psychological
— associated with old age, oral Metrazol in, 197
— dementing; of old age, recovery from, 720
— involutional and senile; electroshock treatment in, 50
Pulmonary: *see* Lungs and bronchi

RADIOISOTOPES: *see* Radiotherapy
Radiotherapy
— radioisotopes; progress against cancer with, 772
— sensitization response (SR) in cancer of uterine cervix, 863
Rationale of sex steroid replacement in "neutral gender," 389
Rectum: *see* Gastro-intestinal tract
Rehabilitation: *see also* Psychiatric; Psychological; Mental
— and physical medicine on geriatric ward, 463
Reperitonization, successful nonsurgical; of pelvic floor following radical excision for cancer of rectum, 589
Respiratory: *see* Lungs and bronchi
Retrorectal hemangioendothelioma, 867
Rheumatic disease: *see* Bones and joints
Roentgen ray: *see* X-ray

SCREENING: *see* Diagnostic
Senescence: *see* Age
Senile: *see also* Age; Geriatrics; Psychoses
— and involutional psychoses; electroshock treatment in, 50
Sensitization response (SR) in cancer of uterine cervix, 863
Serum: *see* Blood
Sex steroid replacement; rationale of, in "neutral gender," 389
Shock treatment: *see* Electroshock
Sigmoid: *see* Gastro-intestinal tract
Sitosterol: *see* Blood
Sleep and sleep disturbance in geriatric psychiatry, 493
Small bowel: *see* Gastro-intestinal tract
Social service activities; integration of, and post-hospital adjustment of aging, 467
Sodium metabolism; normal and abnormal, 540
Steroids: *see also* Hormones; Adrenal
— sex steroid replacement; rationale of, in "neutral gender," 389
— steroid studies: influence of anabolic steroids on chromatographic patterns of 17-ketosteroid excretion by hypogonadal and aged men, 754
Stomach: *see* Gastro-intestinal tract
Strength of opinion as indication of philosophy of life; relationship between strength of opinion and adjustment, 306
Stress: *see* Histamine
Subdural hemorrhage: *see* Brain
Subject index to Volume III, 1047
Surgery
— biliary-tract surgery in patients past 60 years of age, 146
— cancer of breast, 396
— chemopallidectomy: neurosurgical technique useful in geriatric parkinsonians, 839
— cholecystostomy patient; fate of, 21
— elderly surgical patient; fluid, electrolyte and nutritional management of, 311
— for genital prolapse in aged, 43
— fracture of hip in aged; new trends in treatment of, 106
— hip fracture in geriatric patient; management of, 113
— injection of hot water into gasserian ganglion; tic douloureux (trigeminal tic) and other pains of 5th cranial nerve, 416
— intestinal obstruction in the aged; treatment of, 1027
— intrathoracic surgical procedures in patients past age of 60, 330
— involutional and senile psychoses; electroshock treatment in, 50
— medical and surgical management of diverticulitis in geriatric patients, 55

— of biliary tract; preparation of geriatric patient undergoing, 667
— palliative, in cancer of rectum and colon, 731
— physiologic reserves in the aged; application to operability, 93
— prostatic obstruction in the aged, 1005
— reperitonization, successful nonsurgical; of pelvic floor following radical excision for cancer of rectum, 589
— surgical experience in the aged as aid to surgery in young, 85
— surgical management of emphysematous blebs and bullae, 15
— surgical treatment of human hypertension, 248
— sutures, absorbable collagen; mechanism of absorption and antigenicity of, 572
— sympathectomy for occlusive arterial disease, 580
— total gastrectomy; use of right colon as substitute gastric pouch after total gastrectomy, 552
Surgical: *see* Surgery
Sutures: *see* Surgery
Sympathectomy: *see* Surgery
Symposium, Graduate, on Geriatric Medicine: *see* American Geriatrics Society

TESTIS: *see also* Climacteric; Prostate
— hypogonadal and aged men; influence of anabolic steroids on chromatographic patterns of 17-ketosteroid excretion by, 754
— impotence; problems of, in aging males, 883
Texas Geriatrics Society; Annual meetings of, 77, 1042
Therapeutics: ultrasound waves in; review of present status, 596
Therapy: *see* under specific form thereof
Thompson, Willard Owen; obituary, 623
Thyroid
— antithyroid compound (methimazole); variations in response of individuals of different ages to, 96
— thyroxine therapy in preventive geriatrics, 217
Thyroxine: *see* Thyroid
Tic douloureux; *see* Nervous system
Trigeminal tic: *see* Nervous system
Tuberculosis: *see* Lungs and bronchi
Tumors: *see also* Cancer; and under specific organ involved
— retrorectal hemangioendothelioma, 867

ULCER
— gastric ulcer; dilemma of, benign or malignant?, 1027
Ultrasound waves in therapeutics; review of present status, 596
University of Michigan Eighth Annual Conference on Aging (1955); announcement of, 283
Uterus and cervix
— genital prolapse in the aged; significance and management of, 43
— uterine cervix; sensitization response (SR) in cancer of, 863

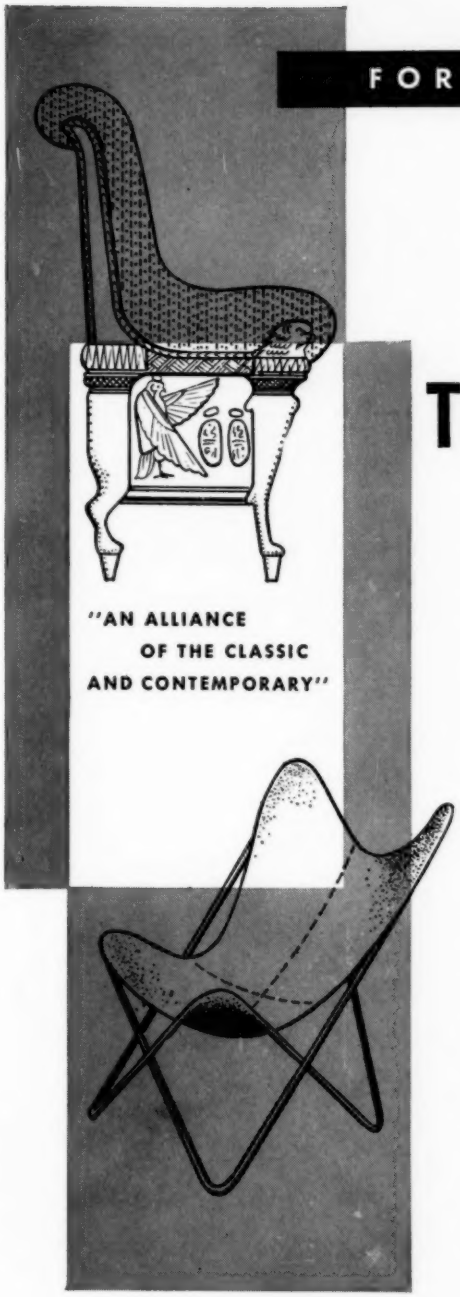
VARICES: *see* Vascular system
Vascular system: *see also* Heart
— arterial hypertension; 33 years' experience in management of, 172
— atherogenic index; serum lipids, lipoproteins; in normal subjects 80–100 years of age, 367
— atheromatous and essential benign hypertension—2 clinical entities: differential diagnosis and treatment, 607
— atherosclerosis, lipotropic therapy in, 527
— cerebral arteriosclerosis and so-called presenile scleroses, 488
— cerebrovascular accidents; unsuspected cardiac infarction with, 714
— chemopallidectomy: neurosurgical technique useful in geriatric parkinsonians, 839
— coronary blood flow; studies on, with emphasis on treatment of coronary insufficiency, 521
— esophageal varices: causes other than cirrhosis and portal-vein block, 681
— fresh infarction of heart; anticoagulant therapy in, 226
— headache of vasoconstrictive type, newer method of nicotinic acid therapy in, 545
— heart disease; panel discussion on, 877
— human hypertension; surgical treatment of, 248
— hypertensive patient; treatment of the elderly, 710

Vascular System—*Continued*
— lipotropes and sitosterol; effects of, on level of blood lipids and clinical course of angina pectoris, 381
— nicotinic alcohol; use of, in state hospital geriatric patients, 473
— obesity; physiologic effects on heart; incidence in coronary disease, 299
— occlusive arterial disease; sympathectomy for, 580
— primary hypertension in older age group; treatment of, 910
— retrorectal hemangioendothelioma, 867
— subdural hemorrhage in the very aged; diagnosis and treatment of, 984
— vascular degeneration, premature, in diabetes mellitus; pathogenesis, and relation to aging, 804
Vasoconstrictive: *see* Vascular system
Vein: *see* Vascular system
Vitamin therapy to reverse certain concomitants of aging; use of, 927

WIDOWS, basic needs of selected group of; as revealed through projective questions, 902
Wilkinson, Robert Johnson; obituary, 625
Women: *see* Uterus and cervix; Psychological

X-RAY findings in geriatric surveys, 704

FOR HYPERTENSION



"AN ALLIANCE OF THE CLASSIC AND CONTEMPORARY"

Synergistic Therapy with New

THEOMINAL® R.S.

Now you can give your hypertension patients the compound therapeutic advantages of two successful hypotensive agents: **Theominal (theobromine with Luminal®) and purified Rauwolfia serpentina alkaloids.**

THEOMINAL R. S. *gives Better Control of Cardiovascular and Subjective Symptoms*

Theominal R. S. offers both the vasodilator and myocardial stimulant actions of theobromine with Luminal and the moderate central hypotensive effect of Rauwolfia serpentina. Gentle sedation calms the patient and a feeling of "relaxed well-being" is established. With Theominal R. S. the therapeutic potency of each of the components is enhanced and the chance of a patient's sensitivity to any one drug is lessened.

Each Theominal R. S. tablet contains:

Theobromine	0.32 Gm. (5 grains)
Luminal	10 mg. (⅙ grain)
Purified extract of Rauwolfia serpentina alkaloids	1.5 mg.

DOSE: 1 tablet two or three times daily.

SUPPLIED: bottles of 100 and 500 tablets.

Winthrop LABORATORIES INC.

(Formerly Winthrop-Stearns Inc.)

NEW YORK 18, N. Y. WINDSOR, ONT.

THEOMINAL AND LUMINAL (BRAND OF PHENOBARBITAL), TRADEMARKS REG. U. S. PAT. OFF.

you can warm cold feet

with

ORAL **Priscoline®**

hydrochloride
(tolazoline hydrochloride CIBA)

a potent
peripheral vasodilator

Orally and parenterally
effective, intra-arterially
as well as intramuscularly
and intravenously.
Of proved value in peripheral
ischemia and its sequelae:
pain, loss of function,
ulceration, gangrene, and other
trophic manifestations.

Comprehensive information on
intra-arterial as well as
other therapy with Priscoline
is available upon request
to the Medical Service Division,
CIBA Pharmaceutical Products, Inc.,
Summit, New Jersey.

Tablets, 25 mg. (Scored)
Elixir, 25 mg. per 4-ml. teaspoonful
Multiple-dose Vials, 10 ml., 25 mg. per ml.

C I B A

2/20838M